Indicators for Analyzing the Risk Exposure of Enterprises and Households

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This paper describes indicators that were developed to analyze the exposure of enterprises and households to financial risks. In this context, we distinguish three types of risk: interest rate risk, price risk and exchange rate risk. Our indicators measure risk exposure by the share of financial instruments exposed to these risks in the assets and liabilities of enterprises and households. Specific conceptual and technical problems arise when recording indirect investment via financial intermediaries. Statistics compiled by the Oester-reichische Nationalbank (OeNB) are used as the primary data basis. Although the indicators lack informative value at the micro level, they facilitate an analysis of corporate and household risk performance at the sectoral level.

Introduction

Enterprises and households are increasingly exposed to financial risks. With rising prosperity, financial assets are burgeoning, making stronger diversification possible. As a result, bank deposits are now more and more often being substituted for riskier capital market products. In addition, risk-bearing capacity increases as the volume of financial assets expands, which means that enterprises and households are likely to be more willing to assume risks. Owing to financial innovations, furthermore, a wider range of investment and financing options is currently available to investors. Examples of financial products that have become highly popular in recent years are structured products, which serve as investment products, and foreign currency loans, which serve as financing instruments. Most of these products are exposed to risks to which traditional products are not subject.

Structural reforms – such as the stepping up of funded pension provision – also promote the greater involvement of real economy sectors in financial risks. Likewise, the growing influence of capital markets on the financing structure of Austrian enterprises is attributable in part to political measures (Basel II, the promotion of capital markets, monetary union as a stimulus for financial market growth, etc.). Changes in the international environment have also altered corporate financing requirements (e.g. FDI financing in the wake of the internationalization of the Austrian economy). Furthermore, banking sector risks are increasingly being transferred to other financial intermediaries and thus, indirectly, to the household sector – whether because of the higher market risk for life insurance companies and pension funds or because of the sale of credit risks to pension funds and insurance companies (for further details on this latter point, see IMF, 2005).

Refereed by:
Michael Andreasch,
Stefan W. Schmitz,
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The Oesterreichische National-bank (OeNB) therefore upgraded its analysis of the financial risks arising from the investment and financing of Austrian enterprises and households. In an initial step, this analysis attempts to assess, on an aggregated basis, the extent to which enterprises and households are exposed to these risks and how this exposure changes over time. The indicators that were developed to analyze exposure on an ongoing basis capture not only direct investment but also the increasingly risk-relevant phenomenon of indirect investment via financial intermediaries. Although some of these indicators have already been used in previous issues of the OeNB's Financial Stability Report, none has so far taken indirect investment into account.

This contribution describes the aforementioned indicators in terms of their design and data collection methods.[2] The second section discusses the design and data basis of our indicators, while the third section gives a detailed description of their composition. The final section presents the conclusions.

Design and Data Sources of Indicators

Quantification of Risk Exposure

The indicators described in this paper measure risk exposure based on the share of corporate and household assets and liabilities that are subject to changes in value owing to price fluctuations in the financial markets (interest rates, exchange rates, stock prices, etc.). In this context, we distinguish three types of risk:

– interest rate risk, which consists in a change in the general level of interest rates (change in an interest rate's absolute level or in the shape of the yield curve),

– price risk, which is the risk of a change in asset prices, and

– exchange rate risk, which arises from price fluctuations between the invoicing currency and the reference currency of the borrower or investor. This type of risk ultimately constitutes a special case of price risk but is dealt with separately on account of its importance.

Indicators of risk exposure are calculated using the ratio of outstanding volumes of financial instruments that are subject to these risk types to total financial assets or total financial liabilities according to the financial accounts. They are therefore simple ratios that can range from 0 to 1 (or from 0% to 100%).

The indicators are used for two purposes: First, to quantify and observe on an ongoing basis the exposure of enterprises and households to the three types of risk listed above; second, they make it possible to estimate the relative degree to which financial assets or liabilities are affected by these individual types of risk and thus to signal structural shifts (from a risk perspective) within assets and liabilities – for instance, in relation to the changing role of capital markets. Risk exposure indicators therefore provide a basis for further in-depth analyses of the risk situation of enterprises and households.

Sectoral Analysis

To be able to use our indicators to monitor risk exposure on an ongoing basis, data that are periodically available is required. With respect to the

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[2] In future issues of the OeNB's Financial Stability Report, the information provided by these indicators will be analyzed in the reports section.

OeNB's Financial Stability Report, this means a minimum periodicity of six months and the smallest possible time lag. Indicators are usually available as quarterly data.

Other than for banks, which periodically make available comprehensive data to the OeNB, individual data on assets and liabilities are not available for enterprises and households. Reporting obligations and regular representative surveys are also lacking.[3] Our indicators are therefore calculated on the basis of macroeconomic sources of data.[4] The most comprehensive data source available for this purpose are the financial accounts, which provide a uniform framework for reflecting both financial transactions and financial assets, classifying them by financial instrument and economic sector. Financial accounts are compiled on an annual basis. For selected financing instruments, quarterly data are also published for enterprises and households (OeNB, 2007). The values for the total volumes of individual financial instruments held by enterprises and households stem from these quarterly data. The financial accounts, however, do not provide specific details on individual financial instruments, and many data are not published at all (or, at least, not on a quarterly basis). For the purpose of classifying financial instruments by individual risk type, therefore, data provided by the financial accounts are supplemented with data from other statistics that are periodically collected by the OeNB and – in some cases – with data compiled by third parties.

Based on these data, our indicators make it possible to state whether the exposure of enterprises and/or households to a specific risk changes over time. Such a change in risk exposure can signify that either the number of enterprises and households concerned has changed or that their average exposure has changed. This sectoral analysis does not, however, take account of the fact that risks on both the assets and liabilities sides of individual corporate and household balance sheets can offset each other. The same applies to individual products (e.g. foreign currency loans for which regular payments are made into a separate repayment vehicle). In addition, these indicators do not capture second-round effects such as the impact of exchange rate changes on enterprises' export potential or the impact of interest rate changes on the price of non-interest-bearing assets (e.g. stocks, real estate). Neither are reinvestment risks taken into account, nor the fact that both issuers and investors frequently have the opportunity to change the risk profile of their assets and liabilities by calling them in prior to maturity.

Finally, it should be noted that for some items no data are available; our

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[3] *The OeNB still compiles statistics on the financial statements of Austrian enterprises. The respective data are made available to the OeNB in the context of their refinancing activities by enterprises and banks and are supplemented by aggregate data from a third-party provider (Austrian Institute for SME Research). Data are mainly provided by, or on, large enterprises, which means that the data set is not representative of the corporate sector as a whole. Since the data are based on audited balance sheets, they are only available on an annual basis and have a time lag exceeding twelve months.*

[4] *The definition of the corporate sector and the household sector conforms to that of the European System of Accounts in its 1995 version (ESA 95), which defines enterprises as belonging to the sector of nonfinancial corporations (sector S.11). The household sector corresponds to households including nonprofit institutions serving households (S.14 and S.15), including the liberal professions and the self-employed.*

data must therefore be supplemented by a number of estimates and assumptions. For this reason, the informative value of these indicators is limited: They represent only a relatively crude measure of risk exposure. Moreover, their informative value is also limited by problems related to their design and the different types of financial instruments included in the indicators – an issue that is dealt with in the following section.

Recording of Indirect Investment
Our indicators incorporate data relating to financial instruments on both the assets and liabilities sides of corporate and household balance sheets that are subject to interest rate or price fluctuations. On the assets side[5] the indicators cover deposits, bonds and stocks, while on the liabilities side[6] they cover loans and bonds.

However, enterprises and households do not only invest directly in these financial instruments, but also indirectly via financial products issued by financial intermediaries such as capital management companies, insurance companies as well as pension funds and severance funds.[7] In recent years, these intermediated financial products have gained importance for the household sector, in particular. Not all the instruments considered in this discussion are relevant to both sectors, however. For instance, en-

terprises do not have any claims on life insurance reserves, pension funds and severance funds, while households do not issue bonds and stocks.

If we include intermediated financial products in our analysis, this creates both technical and conceptual problems. With respect to data collection, one problem is that data relating to investments by financial intermediaries (and thus to the composition of indirect investment) are not available from the financial accounts and that their composition must therefore be approximated using other statistics. For mutual fund shares, this approximation is carried out using the assets of investment companies according to mutual fund statistics, while for households' net equity in life insurance reserves we rely on insurance companies' assets according to the OeNB's insurance statistics. Holdings of enterprises and households are approximated on the basis of the composition of retail funds, which also include the shares in mutual funds (funds of funds) held by the investment companies themselves. The composition of specialized funds is used for approximating the mutual fund shares held by insurance companies. As for pension funds, our approximation is based on the OeNB's pension fund statistics, on data from the Oesterreichische Kontrollbank (OeKB) relating to the

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[5] For data reasons, loans issued by enterprises and households are not taken into account. The financial accounts show that, in practice, households do not issue loans; so any loans issued would in fact only relate to the corporate sector. Data relating to loans issued by the Austrian corporate sector are not included in the financial accounts. Cross-border loans, which primarily play a role in intra-company financing within the framework of corporate FDI, are included although data relating to the interest rate regime or the currency composition are not available. The same applies to loans issued by nonbank financial intermediaries considered here.

[6] Stocks are not included on the liabilities side since, in respect of issuers, these are not subject to any of the risks considered in this paper.

[7] Even though deposits are also intermediated financial products, we do not take them into account in this respect since neither the interest paid on them nor their repayment depend on the degree to which banks are subject to the three risk types considered here.

portfolio composition of pension funds (available from the OeKB's website at *www.oekb.at)* and on data from the Austrian occupational pension fund association. As regards severance funds, recourse is made to data sent to the OeNB under the Regulation on Quarterly Reports by Severance Funds (hereinafter referred to as severance fund statistics). For data reasons, the composition of the (growing) investment with foreign financial intermediaries must be approximated on the basis of investments of domestic intermediaries.

As regards pension funds, we also recognize that investment risks only pass through to households from defined contribution pension funds.[8] To calculate our indicators, the invested volume is assigned to defined contribution and defined benefit pension funds in the same proportion as the number of active and retired beneficiaries according to the latest data available from the Austrian occupational pension fund association.

The portfolio composition of financial intermediaries is then conferred upon the financial assets of enterprises and households held in individual financial intermediaries. This approach is based on the assumption that the composition of enterprises' and households' investments in mutual fund shares, life insurance plans and pension funds corresponds to that of the total assets of retail funds, insurance companies and pension funds. Naturally, a certain degree of imprecision is inherent in this assumption. Furthermore, it should be noted that the assets of individual financial intermediaries may also be used for other purposes. In insurance statis-

tics, for instance, insurance companies' assets act as underlying assets for both life insurance and other insurance business (e.g. health and property/casualty insurance).

Finally, it must be taken into account that different statistics – especially where stocks and bonds are concerned – employ different concepts and definitions for individual financial instruments, which may give rise to certain discrepancies. What is more, if not adjusted, changes in reporting might also generate distortions.

In terms of design, it is important to note that some of the key differences between these various forms of investment are not evident in the aggregate analysis of direct and indirect investment. Compared with directly investing in individual securities, investing via intermediaries reduces risk as intermediaries offer the option of risk pooling. Financial intermediaries are also in a position to ensure professional risk management – something for which households often do not have the necessary resources and financial expertise. Actual risk exposure is, furthermore, modified by the fact that financial intermediaries frequently hedge their investments. The indicators described here cannot capture the distinction between direct and indirect investment, however. Above all, it is not possible to quantify the risk mitigation that is effected by intervention of an intermediary. Moreover, the direct use of hedging instruments (which is widespread in the corporate sector, in particular) is not taken into account, either.

From a risk perspective, it is also relevant that the current data situa-

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[8] *The risks arising from defined benefit pension funds are borne by employers, but a breakdown by economic sectors (nonfinancial corporations, financial corporations and government) is not possible.*

tion does not permit the inclusion of guarantees, which are associated with a large number of financial products. These relate to life insurance policies, pension funds and severance funds, as well as to mutual funds or structured products provided with guarantees.

Consequently, some uncertainties in terms of design are also inherent in the indicators described in this paper, which is why these indicators are rather suited to capture the change in risk exposure over time than to depict the absolute level of risk exposure. Nonetheless, they should throw some light on the development of individual risk types over time and on the contribution of indirectly held assets to the total exposure of enterprises and households.

Calculation of Indicators
Interest Rate Risk
Changes in interest rates have a twofold impact. First, they influence both interest income from investment and the interest paid on liabilities. Second, they affect the prices of fixed-income securities in the secondary market. In terms of exposure to interest rate risk, we only consider the first case, i.e. the impact on regular interest payments and regular interest income.[9] The impact of interest rate changes on security prices will be analyzed in connection with price risk.

The level of interest rate risk depends on the interest rate fixation periods of financial instruments (fixed or floating interest rates). The longer the period concerned, the higher the share of assets and liabilities that are sensitive to interest rate fluctuations.

A detailed analysis, however, cannot be carried out owing to a lack of sufficient data relating to the interest rate fixation periods of the individual financial instruments. At the very least, a distinction is made (where possible) as to whether the interest rate is floating (with a maximum interest rate fixation period of one year) or fixed over a longer period of time. In the first case, the interest rate risk is described as short-term and, in the second, as long-term risk.

Assets
In Austria, *deposits* usually have a floating interest rate. Only capital savings books and some building and loan deposits have fixed interest rates. According to the statistics on building and loan associations, building and loan deposits accounted for about 10% of total deposits at end-2006. However, it is not known what share of these deposits has a floating interest rate. Current data relating to capital savings books are not available. In the period from 1995 to 2003, the share of capital savings books in total deposits held by households stood between 11% and 14% (mean: 12%). On the basis of these historical data, we assume that 20% of household deposits have fixed interest rates and 80% have a floating rate.

Since enterprises do not invest in capital savings books or in deposits made under building and loan contracts, their deposits are considered to be entirely exposed to short-term risk. A small degree of inaccuracy arises because the financial accounts' quarterly figures only show enter-

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[9] *This paper does not consider opportunity costs arising from the fact that borrowers do not enjoy falling interest rates in respect of long-term fixed rate loans or that depositors do not enjoy rising interest rates in respect of long-term interest rate fixation periods.*

Table 1

Data Sources for Classifying Interest Rate Risk Indicators

Financial instrument	Sectors		Data source for . . .	
	Enterprises	Households	A[1]	B[2]
Assets				
Direct investment				
Deposits	×	×		Enterprises: 100%, households: 80% of deposits short-term
Bonds	×	×		ISSTAT/BIS[3]
Indirect investment				
Mutual fund shares Deposits Debt securities including fixed-income securities	×	×	MFSTAT (retail funds)	100% short term ISSTAT/BIS[3]
Insurance assets Deposits Unlisted fixed-income securities and debt securities as well listed fixed-income securities		×	INSSTAT	100 % short term ISSTAT/BIS[3]
Pension funds Deposits Bonds		×	PFSTAT	100 % short term OeKB, MFSTAT (specialized funds)
Severance funds Deposits Debt securities		×	SFSTAT	100% short term ISSTAT/BIS[3]
Liabilities				
Loans	×	×		Enterprises: 100% short term, households: according to shares in new business based on MIR statistics
Bonds	×			ISSTAT[3]

[1] Share of relevant financial instrument in total investment/financing of the relevant intermediated financial product.

[2] Classification of investment according to short-term or long-term interest rate risk.

[3] Classification of domestic issues as short-term/long-term based on Austrian issues (ISSTAT) and of foreign issues based on international issues (BIS).

Note: MFSTAT = mutual fund statistics; INSSTAT = insurance statistics; PFSTAT = pension fund statistics; SFSTAT = severance fund statistics; ISSTAT = securities issues statistics. OeKB indicates that OeKB data on the portfolio composition of pension funds were used; BIS refers to BIS international debt securities statistics, table 13B. Names of individual financial instruments according to the relevant statistics.

prises' bank deposits in conjunction with cash. The financial accounts' annual figures, which show deposits and cash separately, reveal that in the period from 2001 to 2006, cash — on average — accounted for less than 2% of the aggregate figure.

In respect of the fixed-income securities held by enterprises and households, data relating to the total volume outstanding are used as an approximation for classifying them as subject to short-term or long-term interest rate risk. In respect of domestic bonds, the proportion of fixed-rate debt securities (including zero coupon bonds) to floating-rate debt securities of all Austrian issuers according to securities issues statistics is assigned to the domestic bonds held

by both the corporate and household sectors.[10] The foreign debt securities held in corporate and household portfolios are classified using BIS data relating to the total volume outstanding of international bonds with a maturity exceeding one year.[11] The implicit assumption that enterprises and households hold fixed- and floating-rate bonds in exactly the same proportion as these are placed by issuers gives rise to certain inaccuracies. A further inaccuracy results from the fact that bonds also include structured products, which – although they are debt securities (issued by MFIs) from a legal perspective – are in many cases not exposed to interest rate risk but are subject to other risks.

Assets indirectly held by enterprises and households via financial intermediaries (intermediated financial products) are classified as being subject to short-term and long-term interest rate risk as follows: Deposits are wholly classified as being exposed to short-term risk since financial intermediaries neither hold building and loan deposits nor capital savings deposits. Bonds (debt securities) held by financial intermediaries (with the exception of pension funds) are classified according to whether they are fixed or floating using the allocation key derived from securities issues statistics.

Enterprises' and households' holdings in mutual fund shares (according to the financial accounts) are allocated to the different financial instruments in line with retail fund assets according to mutual fund statistics.

To account for the interest rate risk resulting from insurance companies' investments, we use the corresponding assets of Austrian insurance companies according to the OeNB's insurance statistics.

As regards pension funds, the assets grouped under "Bonds, cash and loans" in the OeKB's statistics are classified as being subject to interest rate risk. The share of bonds in assets is estimated by deducting the share of deposits and loans in pension fund assets (according to the OeNB's pension fund statistics) from the assets grouped under "Bonds, cash and loans" in the OeKB's statistics. When classifying bonds as being subject to either short-term or long-term interest rate risk, we assume that their distribution corresponds to that of bonds held by specialized funds.

In severance fund statistics, deposits ("balances with banks") are only shown in conjunction with cash holdings (for both direct and indirect investment). Severance fund statistics may show bonds both as "debt securities for which the redemption amount owed is less than 2% lower than the issuing price" and as "other debt securities and equity securities." The latter item can also include stocks. A further classification is possible for direct investment, resulting

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[10] More precisely, securities issues statistics data only relate to debt securities with an original maturity of more than one year. A breakdown by money market and capital market instruments (where securities with an originally agreed maximum maturity of up to one year are defined as money market instruments) is shown in the financial accounts only on an annual basis, however. This breakdown reveals that the share of money market instruments in the total of fixed-income securities held by enterprises and households is very small and, what is more, highly volatile. We therefore apply this proportion of fixed to floating rates to all fixed-income debt securities held by enterprises and households.

[11] See BIS (2007, table 13B, International debt securities by type, sector and currency – bonds and notes).

in the segregation of securities issued by specific sovereigns[12] and by credit institutions.[13] These bonds are classified as being subject to interest rate risk. The item "Other debt securities," which comes under "Other debt securities and equity securities," is not recognized in respect of interest rate risk. For indirect investment, which accounts for by far the lion's share of investment in debt securities and equity securities, such a classification not possible. This category is therefore not recognized in respect of interest rate risk.

Liabilities

As with assets, corporate and household liabilities are also differentiated by short-term and long-term interest rate risk. In respect of loans, floating-rate loans are subject to short-term interest rate risk. The MFI interest rate statistics for Austria, which have been compiled since 2003 and classify new lending business by interest rate fixation periods, can be used to throw light on interest rate regimes.[14] These statistics show that, from 2003 to 2006, the average share of euro-denominated corporate loans with a floating interest rate was almost 95%. During this period, this share was subject to only minor fluctuations. As regards loans to households, the average share of consumer loans and home loans with a floating interest rate was 85% and 53%, respectively. The interest rate of foreign currency loans is usually geared to the prevailing money market rate (Waschiczek, 2002) and is therefore also subject to short-term interest rate risk. This is why corporate loans are considered to be entirely exposed to short-term interest rate risk. In the household segment, foreign currency loans are also considered to be entirely exposed to short-term risk. As regards euro-denominated loans, moving averages of five years and ten years are used for consumer loans and home loans, respectively, assuming that their average maturities roughly correspond to these periods. Since the MFI interest rate statistics have only been available since 2003, we use the average shares for the years from 2003 onward until data for a sufficient number of years become available.

In the bonds segment, floating-rate notes issued by the corporate sector are subject to short-term interest rate risk. Data relating to these instruments are found in securities issues statistics.

Price Risk

We differentiate two types of price risks: those arising from changes in interest rates and those arising from changes in stock prices.

In connection with price risk, however, we consider assets only, as loans do not generally bear a price risk for the debtor and price risks to which corporate stocks and bonds are subject are not borne by the issuer.[15]

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[12] *I.e. securities issued or guaranteed by a Zone A country pursuant to § 2 No 18 Austrian Banking Act, by the central or regional government(s) or by international public organizations to which one or more EEA member states belong.*

[13] *I.e. debt securities issued by a credit institution that is established in an EEA member state and subject to special public supervision pursuant to legal provisions to protect the holders of such debt securities.*

[14] *For further details on MFI interest rate statistics, see Swoboda (2003).*

[15] *Indirectly, price risks might well have an impact as price losses in the stock market might have an unfavorable effect on a capital increase.*

Table 2

Data Sources for Price Risk Indicators

Financial instrument	Sectors		Data source for the share of relevant financial instrument in total investment/ financing of the relevant intermediated financial product
	Enterprises	Households	
Price risks arising from changes in interest rates			
Direct investment			
Bonds	×	×	
Indirect investment			
Mutual fund shares Debt securities including fixed-income securities	×	×	MFSTAT (retail funds)
Insurance assets Unlisted fixed-income securities and debt securities as well as listed fixed-income securities Debt securities held by insurance companies via investment funds		×	INSSTAT, MFSTAT (specialized funds)
Pension funds Bonds		×	PFSTAT, OeKB, MFSTAT (specialized funds)
Severance funds Debt securities		×	SFSTAT
Price risks arising from changes in stock prices			
Direct investment			
Stocks	×	×	
Indirect investment			
Mutual fund shares Stocks and other equity securities	×	×	MFSTAT (retail funds)
Insurance assets Listed stocks Listed stocks held by insurance companies via mutual funds		×	INSSTAT, MFSTAT (specialized funds)
Pension funds Stocks		×	PFSTAT, OeKB
Severance funds Other debt securities and equity securities		×	SFSTAT

Note: MFSTAT = mutual fund statistics; INSSTAT = insurance statistics; PFSTAT = pension fund statistics; SFSTAT = severance fund statistics. OeKB indicates that OeKB data on the portfolio composition of pension funds were used. Names of individual financial instruments according to the relevant statistics.

In the securities segment, fixed income securities are exposed to price risks arising from changes in interest rates. Data relating to the portfolio of fixed-income securities directly held by enterprises and households are found in the financial accounts. In the segment of mutual fund shares, debt securities held in mutual funds (both those directly held and those belonging to funds-of-funds) are subject to price risks. As regards insurance, data relating to holdings of fixed-income securities are found in the OeNB's insurance statistics (including the two items "Debt securities and listed fixed-income securities" and "Unlisted fixed-income se-

curities"). Mutual funds held by insurance companies are classified on the basis of their share of debt securities held therein. In respect of pension funds, we use the share of bonds according to the data on the portfolio composition of pension funds published by the OeKB. Since these data only relate to the amount of "Bonds, cash and loans," we apply an approach similar to that adopted for interest rate risk to calculate the share of bonds in assets. As regards investment in severance funds, debt securities held via these funds are subject to price risks arising from changes in interest rates. To calculate the volume invested in debt securities, we adopt an approach similar to that for interest rate risk.

Listed stocks held in corporate and household portfolios are exposed to price risks arising from changes in stock prices. Data relating to direct holdings are found in the financial accounts. The item "Stocks and other equity securities" is used for mutual fund shares (again, including funds-of-funds). For the insurance segment, we use holdings of listed stocks[16] and mutual funds. For mutual funds, we allocate the different financial instruments in line with specialized fund assets according to mutual fund statistics. For pension funds, we use the share of stocks derived from the OeKB's data on the portfolio composition of pension funds. As regards severance funds, we use the item "Other debt securities and equity se-

curities," which was not recognized when determining the price risk that arises from changes in interest rates.

Exchange Rate Risk

For borrowers, exchange rate risks exist notably when the borrowing currency appreciates, which increases the running costs of borrowing (interest rates, annuities) and the repayment amount at the time of maturity. For investors, exchange rate risk consists in the equivalent value of the rate of return (or, in the case of stocks, the equivalent value of the dividends) depreciating in euro terms over the life of the investment and in the decrease of its price in domestic currency.

Since the financial accounts do not show a breakdown by currency and other sources of data differentiate by individual currencies in but few instances, we take account of exchange rate risk only on an aggregated basis for all foreign currencies.

Assets

Data relating to *foreign currency deposits* are found in the MFI balance sheet statistics.[17] The exchange rate risk indicator does not cover bonds held by enterprises and households, as data relating to their currency composition were not available.[18] The same applies to foreign stocks, whose share in total financial assets is relatively small, however. For *intermediated financial products,* the distribution of euro- and foreign currency-

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[16] *Of which only holdings for investment and trading (and not for participation) purposes.*

[17] *It should be noted that financial accounts data relating to the level of corporate and household deposits differ to some extent from the levels shown in the MFI balance sheet statistics. Since the foreign currency share of deposits is relatively small, however, the resulting inaccuracy is likewise minimal.*

[18] *As with the approach adopted for interest rate risk, an inference by analogy using the currency composition of Austrian issuers' debt securities according to securities issues statistics is not permissible here since most foreign currency bonds issued by Austrian issuers are sold abroad, which means that the domestic investors' share in euro-denominated bonds is likely to be considerably higher.*

Table 3

Data Sources for Determining the Foreign Currency Shares
of Exchange Rate Risk Indicators

Financial instrument	Sectors		Data source
	Enterprises	Households	
Assets			
Direct investment			
Deposits	×	×	Foreign currency shares based on the MFI balance sheet statistics
Bonds	×	×	domestic: 0%; foreign: no data available
Stocks	×	×	domestic: 0%; foreign: no data available
Indirect investment			
Mutual fund shares	×	×	Total foreign currency-denominated assets based on MFSTAT (retail funds)
Insurance assets		×	Total foreign currency-denominated items based on INSSTAT
Pension funds		×	Total foreign currency-denominated assets based on PFSTAT
Severance funds		×	Total foreign currency-denominated assets based on SFSTAT
Liabilities			
Loans	×	×	Foreign currency loans based on the Austrian contribution to the Consolidated Balance Sheet
Bonds	×		Foreign currency issues based on ISSTAT

Note: MFSTAT = mutual fund statistics; INSSTAT = insurance statistics; PFSTAT = pension fund statistics; SFSTAT = severance fund statistics; ISSTAT = securities issues statistics. OeKB indicates that OeKB data on portfolio composition of pension funds were used. Names of individual financial instruments according to the relevant statistics.

denominated assets is used in the relevant statistics. With regard to mutual fund shares, we use the proportion of euro- and foreign currency-denominated assets held by *retail funds.*

Liabilities

Foreign currency *loans* and bonds are classified as liabilities that are exposed to exchange rate risk. Data relating to the currency composition of loans to enterprises and households are included in the MFI balance sheet statistics. For foreign currency bonds issued by the corporate sector, the securities issues statistics provide a breakdown by currency (euro or foreign currency).

Summary

This paper describes the data basis and method used to calculate indicators that serve to analyze the exposure of real economy sectors to financial risks. These indicators provide an initial estimation of the risk situation in both the corporate and household sectors and will henceforth be used on a regular basis in the macroeconomic analysis of financial stability and thus also in the reports section of the OeNB's Financial Stability Report.

In addition to being used in analysis, these indicators might also help, in a situation of increased risk, to focus public attention to a greater ex-

tent on certain financial products in a way analogous to the approach adopted for foreign currency loans. In addition, future OeNB publications on financial literacy may further investigate the risk situations signaled by these indicators.

In view of the aforementioned data problems and conceptual uncertainties, the informative value of these indicators is limited. To improve risk assessment, therefore, additional statistics and data should be consulted. In design terms, the next step would be to sound out whether and to what extent guarantees, or the risk-mitigating effects of intermediation, can be included in calculating risk exposure. Finally, as regards a risk-oriented interpretation of indicators – and provided the indicators themselves have proved reliable – further studies might analyze whether it is feasible to assign critical values to these indicators and to interpret it as a potentially negative signal for financial stability if the indicators exceed these critical values.

References

Andreasch, M. 2006. Wertpapierportefeuilles privater Haushalte in Österreich. In: Statistiken – Daten & Analysen Q1/06. OeNB. 63–74.

BIS. 2007. BIS Quarterly Review. International Banking and Financial Market Developments. September.

IMF. 2005. Global Financial Stability Report. April.

Jaksic, B. 2007. Allgemeine Informationen und statistische Daten zu den Mitarbeitervorsorgekassen. Entwicklungen im Jahr 2006. In: Statistiken – Daten & Analysen Q2/07. OeNB. 41–47.

Janda, F. 2007. Pensionskassen in Österreich. Jahresrückblick 2006. In: Österreichisches BankArchiv 55(7). 516–520.

OeNB. 2007. Austrian Financial Accounts 2006. Analyses of Current Financial Accounts Data. Special Issue Statistiken. OeNB. June.

Swoboda, G. 2003. New Harmonized Interest Rate Statistics for the Euro Area – Framework, Implementation in Austria and First Results. In: Focus on Austria 4/2003. OeNB. 162–185.

Waschiczek, W. 2002. Foreign Currency Loans in Austria – Efficiency and Risk Considerations. In: Financial Stability Report 4. OeNB. 83–99.