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Regulation of Financial Systems and Economic Growth

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Alain de Serres, Shuji Kobayakawa, Torsten Sløk and Laura Vartia

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ABSTRACT/RÉSUMÉ

Regulation of Financial Systems and Economic Growth

This paper examines whether regulation that is more conducive to competitive and efficient financial systems has a significant positive impact on sectoral output and productivity growth in a sample of 25 OECD countries. More specifically, following a methodology used by Rajan and Zingales (1998), the paper tests whether industries that depend more heavily on external sources of funding tend to grow faster in countries that have more competition-friendly regulation in markets for banking services and financial instruments. The regulatory indicators are assembled from surveys conducted by the World Bank on regulations in banking and securities markets. They point to substantial variations in the stance of regulation across countries, in particular with respect to the broad rules underpinning securities market transactions. The empirical analysis indicates that financial system regulation matters for output growth both in a statistical and economic sense.

JEL: G15 ; G18 ; G21 ; G28 ; O40

Key Words: Financial systems; external funding; financial regulation; sectoral growth; barriers to competition; investor protection

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Réglementation des systèmes financiers et croissance économique

L'objet de cette étude consiste à examiner, sur la base d'un échantillon de 25 pays de l'OCDE, dans quelle mesure une réglementation plus propice à des systèmes financiers concurrentiels et efficaces entraîne un effet positif significatif sur la croissance sectorielle. De manière plus spécifique, suivant une approche utilisée par Rajan et Zingales (1998), l'étude vérifie si les industries qui dépendent davantage des fonds externes croissent plus rapidement dans les pays dont la réglementation conduit à une concurrence plus vive sur les marchés des services bancaires et des instruments financiers. Les indicateurs de réglementation sont construits à partir d'information recueillie par la Banque Mondiale sur la réglementation dans le secteur bancaire et sur les valeurs mobilières. Ils mettent en lumière des variations substantielles entre les pays, en particulier en ce qui a trait à la réglementation encadrant les transactions sur valeurs mobilières. L'analyse statistique indique que la réglementation des systèmes financiers affecte la croissance de la production de manière significative, à la fois au sens statistique et économique.

JEL : G15 ; G18 ; G21 ; G28 ; O40

Mots clés : systèmes financiers ; financement externe ; réglementation financière ; croissance sectorielle ; entraves à la concurrence ; protection des actionnaires

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REGULATION OF FINANCIAL SYSTEMS AND ECONOMIC GROWTH

by

Alain de Serres, Shuji Kobayakawa, Torsten Sløk and Laura Vartia[1]

1. Introduction

1. The operation of the financial system can have a key impact on economic growth and the stability of the economy. It affects long-term economic growth through its effect on the efficiency of intermediation between the savers and final borrowers of funds; through the extent to which it allows for monitoring of the users of external funds, affecting thereby the productivity of capital employed; and through its implications for the volume of saving, which influences the future income-generating capacity of the economy. It affects the stability of the economy because of the high degree of leverage of its activities and its pivotal role in the settlement of all transactions in the economy, so that any failure in one segment risks undermining the stability of the whole system.

2. The impact of financial systems on growth has been well established empirically. Given the difficulties in directly measuring efficiency in the financial sector, a large number of empirical studies have relied on measures of size or structure to provide evidence of a link between financial system development and economic growth (Levine, 2005).[2] Indeed, nearly all studies based on macro or sector- level data find that financial development, measured as the size of financial intermediation or of external finance relative to GDP, has a significant positive impact on growth, either directly *via* productivity, or indirectly *via* its effect on the build-up of physical and knowledge capital (Pelgrin *et al*, 2002). And the finding is generally quite robust to variations in the sample. For instance, even though the majority of these studies cover a broad range of developed and developing countries, the results of financial development affecting growth have been found to hold also when the sample is limited to OECD countries (Leahy *et al*, 2001).

3. Taken at face value, this would suggest that in order to achieve faster growth, individual countries should vigorously pursue the development of domestic financial markets and institutions regardless of the size of their domestic economy. However, to the extent that markets for banking services and securities exchange are characterised by increasing returns to scale or network externalities, cross-border integration of financial markets may well be one of the major sources of efficiency gains. If all countries might benefit from reduction in costs arising from international market integration, only those

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1. Alain de Serres, Shuji Kobayakawa and Laura Vartia are economists at the OECD Economics Department. Torsten Sløk is an economist with the Deutsche Bank and was at the OECD Economics Department at the time the paper was written. The authors would like to thank Sveinbjörn Blöndal, Jean-Philippe Cotis, Jørgen Elmeskov, Mike Feiner, Asa Johansson, Stephen Lumpkin, Sebastian Schich and other colleagues in the Economics Department and the Directorate for Financial Affairs for valuable comments and suggestions on an earlier version. They also thank Martine Levasseur for statistical assistance and Caroline Abettan for editorial support.

2. For a recent effort in assessing the performance of financial systems using a broad range of indicators, see ECB (2005).

with a comparative advantage in the provision of financial services would be expected to see an increase in the depth of their domestic financial sector. In this regard, beyond a certain threshold most likely to be reached in most developed countries, the size of a domestic financial system as conventionally measured may not be an adequate indicator of efficiency in terms of intermediation costs or productivity of capital employed (Guiso *et al*., 2004).

4. Another limitation of empirical studies linking growth to measures of financial sector size is the difficulty to identify unambiguously the direction of causality. In order to address this issue, several studies have focused more directly on the determinants of financial development and/or on the mechanisms through which the latter affect growth. For instance, Rajan and Zingales (1998) exploit industry-level data across a set of countries to test the theoretical argument that financial development reduces the cost of raising funds from external sources by contributing to overcome problems of moral hazard and adverse selection. They do so by examining whether industries that are typically more reliant on external financing grow faster in countries with better-develop financial systems. More recently, Barth, Caprio and Levine (2004) use a database they have contributed to assemble on the regulation and supervision of banks around the world to examine the relationship between banking regulation and the development of the banking sector.

5. This paper combines the two approaches and uses industry-level data from over 20 countries to examine whether industries that rely more heavily on external sources of funds grow more rapidly in countries where regulation allows for stronger competition in markets for banking services and financial instruments. The construction of regulatory indicators relies essentially on surveys conducted by the World Bank on regulations in banking and securities markets for its member countries.[3] Individual elements from these surveys are aggregated into broader indices directly used in the regression analysis.

6. In the case of banking regulation, the areas covered are separated according to whether they constitute unwarranted barriers to competition or they achieve stability objectives with more limited adverse effect on competitive pressures. Regulatory impediments to competition include barriers to entry (both foreign and domestic) and lines-of-business restrictions. The extent of government ownership is also treated as a barrier to competition, reflecting the potential impact of state control on the level playing field. As for markets for debt and equity instruments, the regulatory indicators cover the following four areas: contract enforcement, access to credit, investor protection and bankruptcy procedures.

7. Using panel regression techniques, the paper examines whether regulation that facilitates competition in banking and that is more conducive to securities market development and efficiency has a significant positive impact on sectoral output growth, productivity growth and firms' entry rates. The output and productivity regressions are performed on a sample of around 25 countries and industries. The entry regression includes fewer countries (16) but a similar number of industries and also has a time-series dimension. Overall, the results indicate that financial system regulation has a statistically significant influence on output and productivity growth, in particular *via* the impact on industrial sectors relying more heavily on external sources of funding. The economic impact is also found to be non-negligible. The analysis suggests that reforms that would align regulations in banking in countries with the most restrictive stance to the OECD average could be associated with an increase in annual GDP growth by ¼ to ½ of a percentage point for a significant period of time. The impact from strengthening investor protection would be somewhat weaker.

3. The two World Bank data sources exploited in this study are the *Bank Regulation and Supervision Database* (http://www.worldbank.org/research/projects/bank_regulation.htm) and the *Doing Business Database* (http://www.doingbusiness.org).

8. The rest of the paper is organised as follows: Section 2 briefly reviews the degree of competition in the markets for banking services and securities on the basis of indicators of outcomes. Section 3 provides a discussion of barriers to competition in financial systems and introduces the regulatory indicators used in the empirical analysis. Section 4 presents the empirical methodology and results and compares those with findings from earlier studies. This is followed by concluding remarks.

2. Competition in financial markets and financial development

9. A key determinant of the efficiency of the financial sector is likely to be the degree of competition markets for financial products and services. As in other sectors, stronger competition between banks and other financial institutions is likely to drive down costs and expand the choice for both savers and users of external finance in a way that is suitable for their respective needs. However, stronger competition in financial markets could conceivably also have adverse implications for the stability of financial institutions and hence economic stability, although there is no evidence that OECD countries with vibrant competition are more prone to instability then countries with more muted market forces.

10. Past trends in deregulation (removal of price controls, elimination of barriers to cross-border capital flows, easing of regulation of banking activities, etc.) and improvements in the technologies of information and communication have undoubtedly raised competitive pressures in most segments of banking services. And, although the wave of liberalisation that took place in the 1980s was initially followed by a series of crises in banking or credit institutions, developments since then underscored the major role played by other factors such as inadequate regulation, skewed incentives created by tax systems, and macro-economic policies. In fact, with the exception of Asia, the banking sector in OECD countries has withstood a number of important shocks since the mid-1990s without major failures.

11. Just how intense these competitive pressures have become is more difficult to judge, however, given that the degree of competition in various markets for banking or securities issuance and trading services cannot be directly observed.[4] Even so, a number of indicators of competition based on measures of costs, margins and import penetration rates point to sizeable differences across OECD countries, suggesting that at least for many of these markets further gains could be reaped from a more competitive financial system, not least in the area of retail banking services:

- Overhead costs as well as net interest margins show that cost structures and pricing strategies vary to a great extent (Figure 1). Banks' overhead costs tend to be relatively high in some lower-income countries, reaching nearly 7% of total assets in Mexico and Turkey, whereas it is comparatively low (less than 1.5%) in Luxembourg and Ireland. Similarly, banks' net interest margins are particularly high in Turkey (11.7% of total interest-bearing assets), while they are less than 1.5% of total interest-bearing assets in Ireland and Luxembourg.

- Measures of international competition in banking suggest that domestic banks are subject to varying degrees of competition (Figure 2). In some countries (Greece and Luxembourg), more than 30% of borrowed funds by the private sector come from across the border, whereas in countries such as Korea and Japan the share of cross-border loans is negligible.

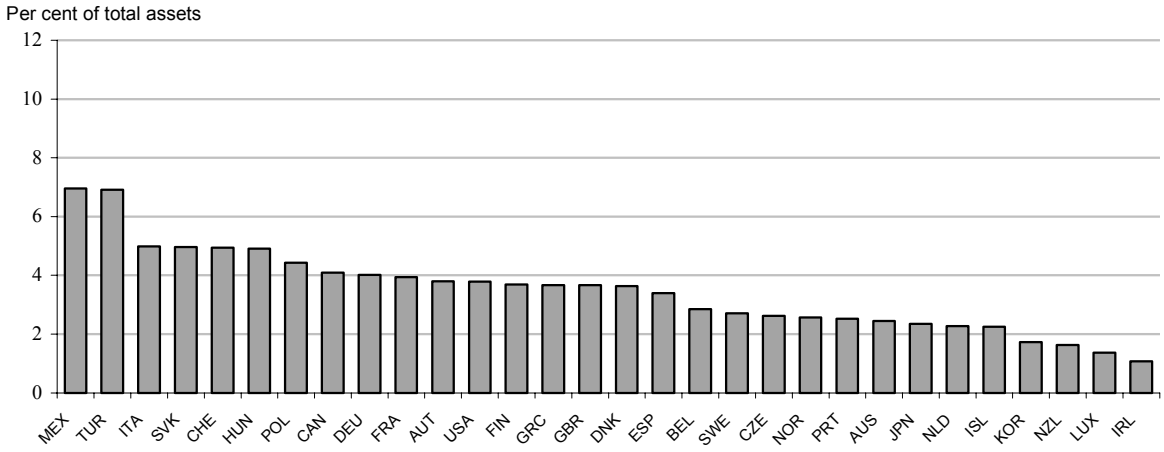
4. One traditional approach to measuring competitive pressures is based on the degree of market concentration, for instance the share of total bank assets in a given market held by the three largest banks. In the case where the domestic market is taken as the relevant market, such measures typically show that concentration is high in small countries (markets), which could be misleading given that banks operating in such markets may nevertheless be facing stiff competition from abroad. However, measures of concentration that take into account cross-border competition are difficult to construct.

- In retail banking services, where a physical presence is usually required, either in the form of branches or subsidiaries, foreign-owned banks play a major role in domestic lending to the private sector in a few countries (notably in Mexico, New Zealand and Central and Eastern European countries). However, in most other countries domestic loan market penetration rates by foreign institutions remain low, particularly so in Japan and euro area countries. The latter is somewhat surprising in light of EU efforts to bolster financial integration.

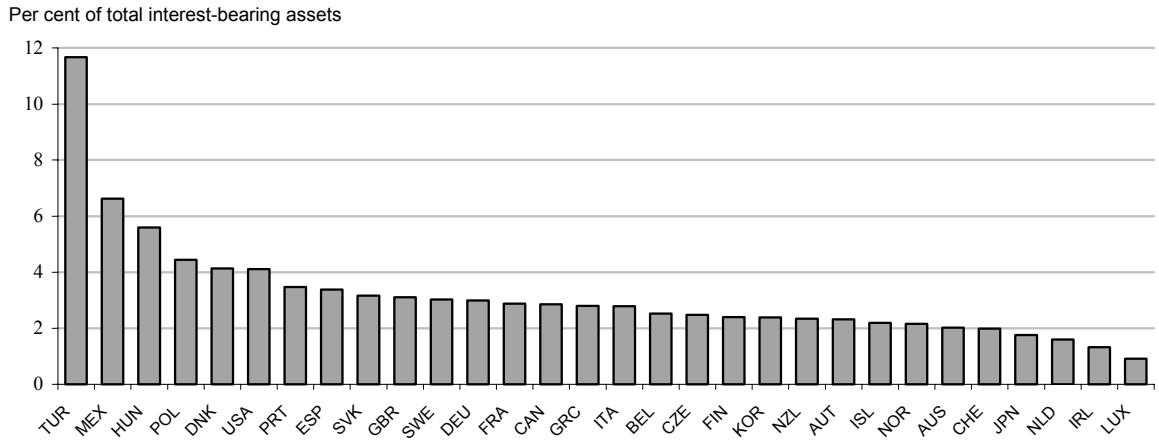
Figure 1. Bank activities: costs and interest margins

Average 1996-2003

A. Overhead costs



B. Net interest margins

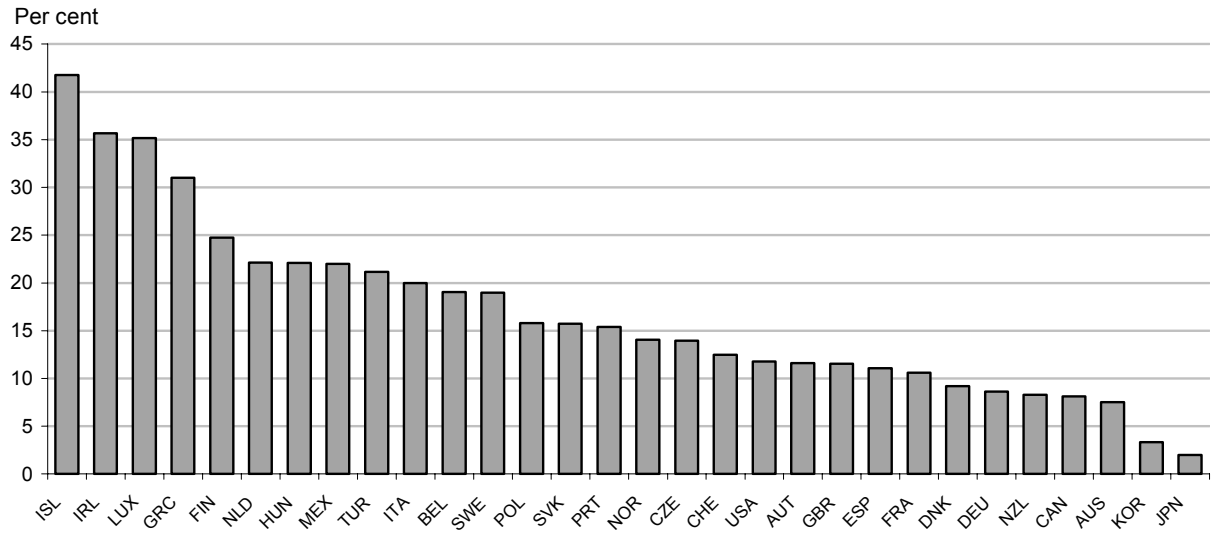


Source: World Bank financial structure database and W*orld retail banking report,* 2005.

Figure 2. International competition in banking

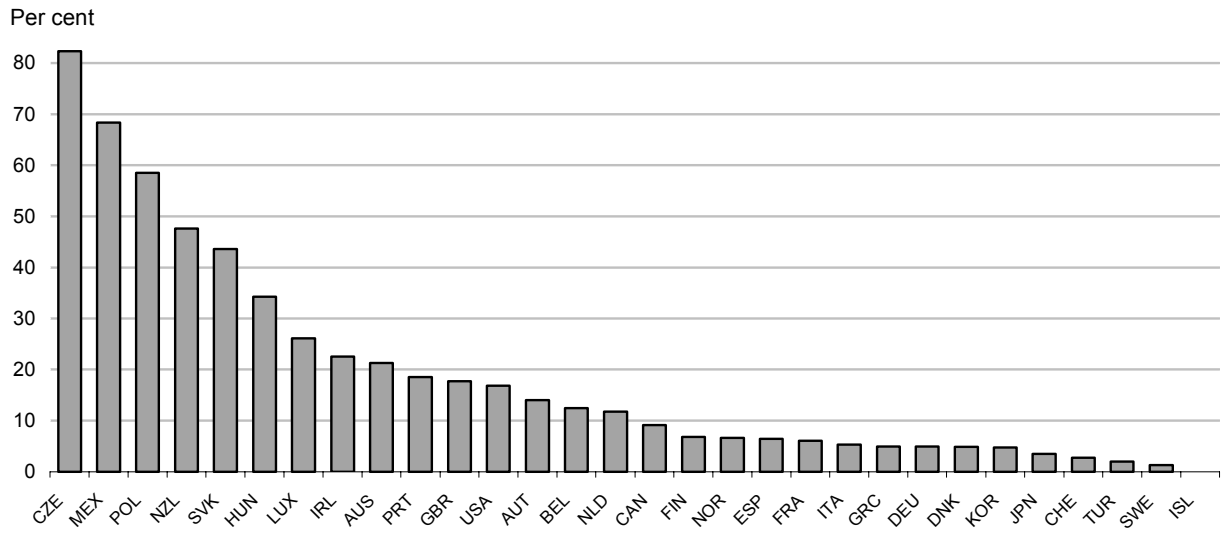
Average 2000-2003

A. Share of cross-border loans in total domestic borrowing[1]



B. Foreign banks' penetration of domestic loan market

Local claims in local currency only[2]



1. Measured as foreign banks' cross-border claims on non-banks as a percentage of all commercial banks' local claims on non-banks plus cross-border claims on non-banks.
2. Measured as foreign banks' local claims in local currencies as a percentage of all commercial banks' local claims on non-bank sectors (i.e. household, non-bank corporations and public sectors). Since the data on local claims in local currencies are not broken down by sector, they include lending to banks as well as to non-bank sectors. As a result, the measure over-estimates the underlying rate of foreign penetration of non-bank domestic loan market.

Source: BIS and IMF.

12. There are indications that markets for corporate bonds and shares have also become more competitive in recent years, reflecting to a large extent the high degree of integration in the market for investment banking services. This is particularly manifest in the case of corporate bonds, where the share of domestic issuance that is underwritten by foreign banks has risen substantially over the past ten years, in particular in the euro area (Barros *et al*., 2005). This has allowed for a substantial reduction in underwriting fees (Santos and Tsatsaronis, 2003). As regards the equity market, cross-country variations still exist in transaction prices despite the tendency for global integration of the industry. Thus, effective spreads, which consist of brokerage fees as well as clearing and settlement fees for equity trading, differ markedly across countries (London Economics, 2002).

13. Behind this are structural factors that hamper competition. Securities exchanges are often fragmented along national borders, preventing scale economies from taking place. One reason for the fragmentation along national lines is that one of the main activities related to securities trading - the process of clearing and settlement - is generally fragmented due to differences in technical requirements, tax regimes and legal systems.[5] This significantly raises the cost of cross-border transactions given the required involvement of additional intermediaries to complete the post-trade process. Furthermore, in some cases, the vertical integration structure of stock exchanges prevents different providers of clearing services from having access to a stock exchange, limiting competition for such services within a country.

14. While indicators similar to those shown above are often used to assess the state of competition, it is important to recognise that they need to be interpreted with care as they are influenced by a host of other factors. For example, insofar as strong competition in retail banking implies the presence of a larger number of branches in local markets, even efficient banks may come-up with relatively high overhead costs. Also, cross-border lending may be low because domestic banks are efficient. For these reasons, a better approach to assessing the state of competition might be to look directly at the strictness of various government regulations that affect competition in banking and securities markets.

3. Barriers to competition in financial markets: The role of regulation and other policies

15. This section discusses regulatory impediments to competition (both from domestic and foreign sources) in various segments of banking activities, as well as of the regulatory underpinnings of securities markets. Using essentially information from comprehensive regulatory databases compiled by the World Bank, the stance of regulation in banking and some aspects of securities markets is presented in the form of quantitative indicators. In addition, the section discusses a number of less formal policy barriers to cross-border competition in securities and banking services. Such barriers include, *inter alia*, differences in national corporate tax systems as well as in legal, technical or accounting standards.

3.1 Banking regulation

16. Banking regulation has often been put in place with several - and sometimes conflicting - objectives in mind, such as promoting strong national financial institutions, offering consumer protection, assisting industrial and/or regional development and preserving financial stability, in particular the safeguarding of the payment and settlement system. This has led in the past to tight and widespread regulation, ranging from interest rate ceilings and branching restrictions to capital requirements and deposit insurance. While some of the most stringent rules such as interest rate controls and branching restrictions have by now been largely eliminated in OECD countries, the sector remains nevertheless one of the most intensely regulated across countries. In parallel, the main objectives of regulation have generally become more narrowly focused, with the main emphasis put on crisis prevention, in particular on limiting systemic

5. This issue has been particularly well documented in the context of the European Union, with reports published by the Giovannini group (2003) as well as by the CEPS (2003).

risks should one or more institutions get into trouble. Furthermore, in an effort to level the playing field internationally, efforts have been made to harmonise prudential regulation across countries *via* the Basel I and II processes.

17. Against this background, the policy challenge is to strike the right balance between preserving the overall soundness of the banking system and fostering its efficiency. A minimum level of regulation is needed to ensure that financial institutions behave prudently, and this inevitably has a cost in terms of higher barriers to entry and reduced competition. However, stability concerns can be addressed through the use of specific instruments that have minimal effects on competition. Indeed, as long as measures such as capital requirements, disclosure rules and risk-based deposit insurance are in place to ensure banks' prudent behaviour, further reductions in direct barriers to competition may need not weaken financial stability or investor protection.[6]

3.1.1 Construction of regulatory indicators

18. In order to compare the stance of banking regulations across countries, the analysis relies essentially on the World Bank's *Bank, Regulation and Supervision Database*. It compiles the results from a detailed survey of banking regulation conducted in 2000 and again in 2002-03 in a large number of countries (see Annex 1 for details regarding the questionnaire and the construction of quantitative indices). As such, it provides a measure of the stance of banking regulation in the countries covered, with some indications of the enforcement powers by supervisors. The survey consists of approximately 250 questions which, for the purpose of this exercise, have been categorised under two broad headings: stability and barriers to competition (Figure 3).

19. Each category is in turn divided in sub-groups according to the specific aspects of regulation covered. The sub-groups for the competition-barriers category include regulatory barriers on domestic and foreign entry, restrictions on banking activities and the extent of government ownership. The sub-groups for stability category consist of ten diverse regulatory areas. Even though the *Bank, Regulation and Supervision Database* contains some information about foreign entry and government ownership, the indicators used in the empirical work are based on alternative sources which were viewed as more comprehensive. More specifically, the index of restrictions on foreign entry in banking is based on earlier OECD work on FDI restrictions (Golub, 2003). As for the measure of government ownership of banks, it is taken from La Porta *et al.* (2002).[7]

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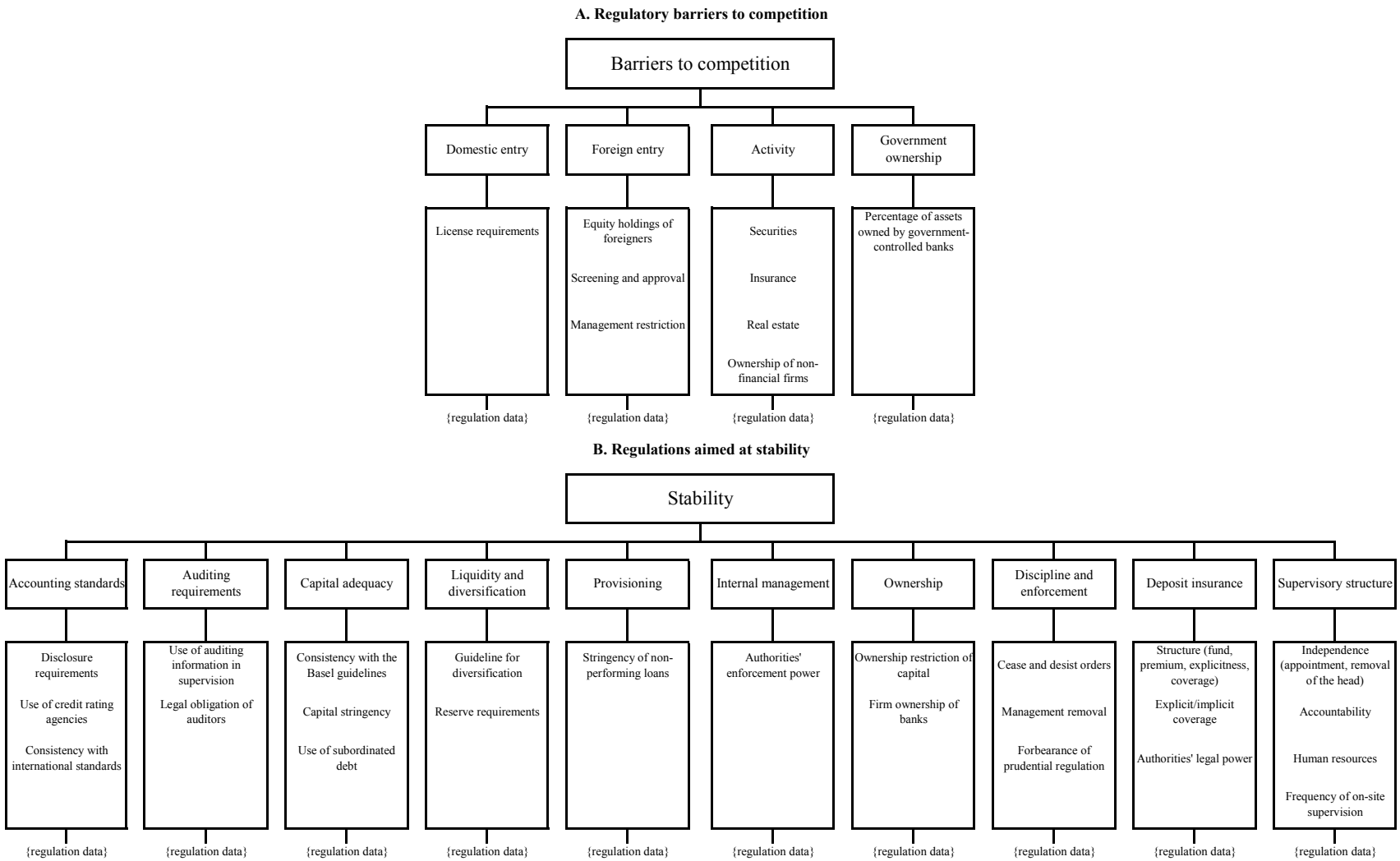
6. Such a view is supported by recent empirical evidence suggesting that restrictions on bank competition has in the past brought significant real economic costs that are not offset by the alleged benefits such as wider access to credit by small and risky firms or lower frequency of bad loans (see Guiso, Sapienza and Zingales (2003) in the case of Italy). Using data on the US banking markets, Cetorelli and Strahan (2004) find that stronger bank competition in local markets (lower state-level restrictions on bank entry) is generally associated with a higher share of smaller establishments as well as with a rise in the number of establishments, while larger firms which benefit from easier access to securities markets are less affected.

7. Compared to the *Bank Regulation and Supervision Database*, these two indicators are based on information that is much earlier, *i.e.* 1998-2000 in the case of restrictions on foreign entry and 1995 in the case of government ownership. As such, they are obviously not necessarily a good indication of current policies, but they are still relevant for empirical analysis over a sample period that covers most of the 1990s.

Figure 3. The system of regulatory indicators for the banking system



20. As is common practice with regulatory indicators, qualitative answers (mostly in the form of "yes" or "no") to a questionnaire have been converted into quantitative indices by attributing a score that increases according to the restrictiveness of regulation. The scores attributed to individual questions (on a scale going from 0 to 1) have first been aggregated into sub-indices, corresponding to the groupings shown in Figure 3, and then into the two broad categories, barriers to competition and stability. Converting qualitative information into quantitative indicators is, however, not without problems. A key issue is to what extent the same weight should be given to all indicators or if some indicators should have a bigger weight, which obviously is crucial to the value of the indicator. One way to address this is to assign random weights to individual or groupings of questions and provide a range of possible values for the index as a function of changing weights, as has been done in the following.[8]

3.1.2 Results

21. Figure 4 shows the constructed regulatory indicators for the broad competition and stability categories. The mid-point (*i.e.* the white circle) shows the average index and the ranges shown in shaded areas are calculated using the random weights technique (using 90% confidence intervals). On the basis of this technique, only relatively few OECD countries differ from the OECD average with respect to regulatory barriers to competition – although there are some "outsiders" at both end of the spectrum. Looking at regulations aimed at stability suggests narrower confidence intervals and hence greater dispersion with a number of countries being clearly below or clearly above the OECD average.

22. At the time the survey was conducted (2002-03), the indicator for regulations affecting competition shows that Korea, Greece, Iceland and Central and Eastern European countries tended to have generally stricter regulation. By contrast, regulations in this area were particularly permissive in New Zealand, the United Kingdom, France and Finland. Most other countries were found to lie within a fairly narrow range around an intermediate position with respect to competition-restraining regulations in banking.

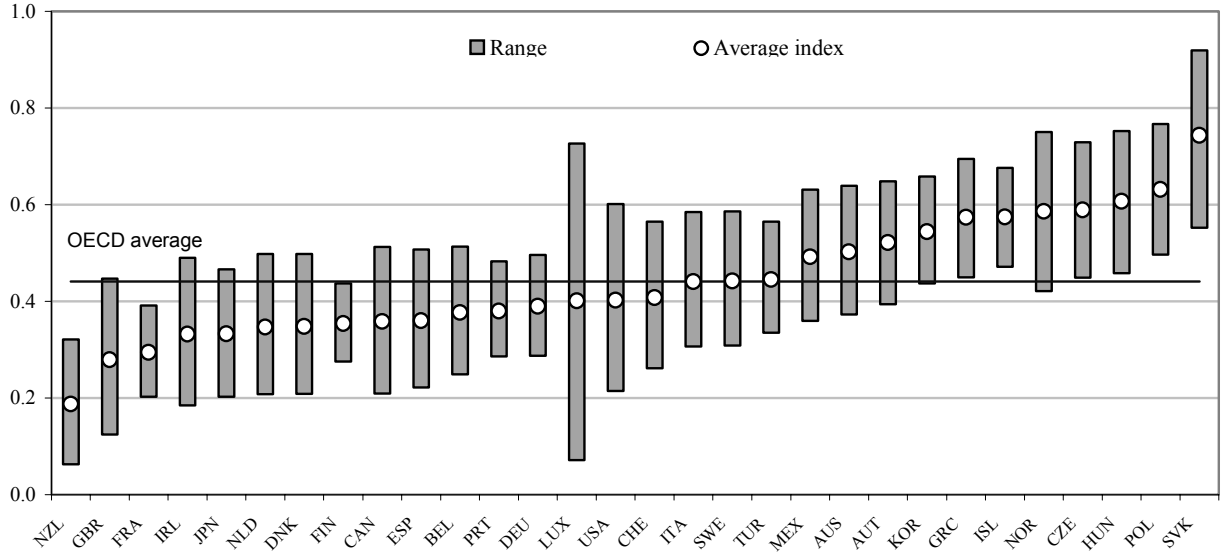
23. The overall indicator of barriers to competition can be further decomposed into its main sub-indices (Figure 5). Most OECD countries tend to have relatively stringent requirements to set up banking institutions, and regulations tend to be comparatively homogenous across countries. Thus, basically all countries require extensive information about financial projections for new banks and their business plan, the sources of equity and the financial status of the main potential shareholders, the planned organisation of the bank and the background of future directors and managers.

24. Somewhat more variations are observed with respect to activity control and restrictions to foreign entry into banking (at least as they were prevailing in the late 1990s). Controls on the types of activity that bank can engage into are particularly low in many European countries. Government ownership of banks was most extensive in Austria, Iceland, Norway and Eastern European member countries in the mid-1990s, while the banking system was fully in private hands in many countries, including Canada, Japan, New Zealand, the United Kingdom and the United States at that time. Overall, there is little correlation between the stances of regulations across the different areas, which explains the relatively large confidence band (top panel of Figure 4).

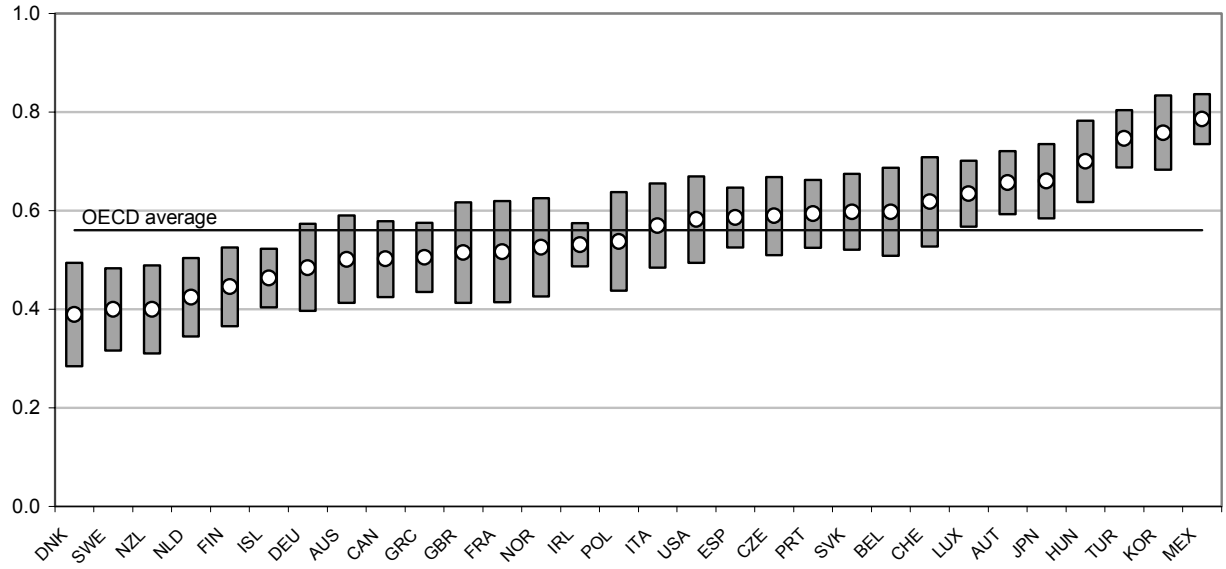
8. See Freudenberg (2003) for a discussion of how to create indicators and how to carry out the random weights technique.

Figure 4. **Banking regulation indices, 2003**[1]

A. Overall regulatory barriers to competition



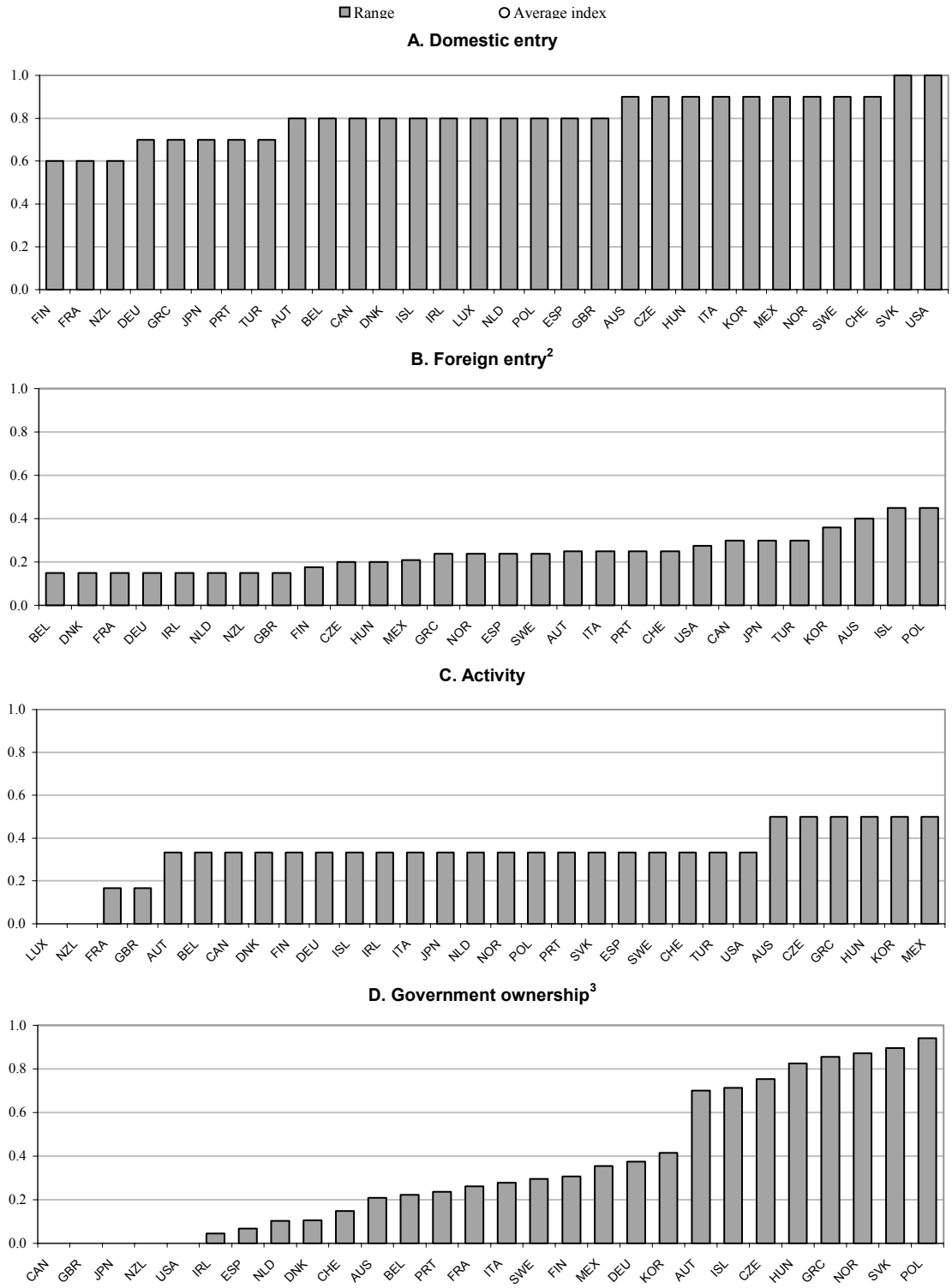
B. Regulations aimed at stability[2]



1. The scale of the indicator is 0-1 from least to most restrictive. A higher value indicates more competition-restraining regulation.
2. Covers different measures related to prudential regulation of banking sector.

Source: OECD and World Bank, Bank regulation and supervision database.

Figure 5. **Barriers to competition in banking**[1]



1. The scale of the indicator is 0-1 from least to most restrictive. A higher value indicates more competition-restraining regulation.
2. Restrictions to foreign entry are taken from Golub (2003). This index reflects the stance of regulation prevailing in the period 1998-2000.
3. Measures the amount of assets held by banks (among the 10 largest) where government ownership is at least 20 per cent as a ratio of total assets (of the 10 largest banks). The measure is taken from La Porta *et. al* (2002) and applies to 1995.

Source: OECD and World Bank (Bank regulation and supervision database) and La Porta *et. al* (2002).

25. Regulations related to prudential conduct in the banking sector are comparatively strict in some low-income member countries and relatively light in some Nordic countries, New Zealand and the Netherlands. As reflected in the comparatively narrow confidence intervals for the stability-oriented regulation index depicted in Figure 4 (lower panel), policies tend to be applied more consistently in the ten different areas making up the index. For example, countries with tight accounting standards and auditing requirements also tend to give regulators relatively strong powers to intervene in the internal management of banks.

3.1.3 Correlations of banking regulations and financial development

26. Simple correlation analysis shows that across countries the variables measuring aspects of regulation in the banking industry appear related to financial development and with an effect that is in conformity with priors (Table 1). More specifically, stricter anti-competitive regulation is associated with lower bank assets relative to GDP though not with private credit by banks relative to GDP. At a lower level, these indicators of banking sector development are negatively (albeit, weakly) associated with regulations on foreign entry and activities. To some extent, these results corroborate those found in an earlier study based on the same regulatory data set (albeit from an earlier vintage, see Barth, Caprio and Levine, 2002).[9] With respect to stability-oriented regulations, the correlations reported in Table 1 suggest that they tend to be negatively associated with financial development, though the correlation is not statistically significant for some of the more specific regulatory areas.

3.2 Securities market regulation

27. In contrast to banking regulation, tensions between different regulatory objectives have been less of an issue in the case of securities markets. This owes much to the fact that a core objective of market regulation - investor protection defined in a broad sense - is also viewed as contributing positively to financial system efficiency. Even so, striking the right balance between protecting the rights of various stakeholders (shareholders, creditors, entrepreneurs/managers, employees) on the one hand, while allowing firms and markets to function efficiently on the other, does involve complex policy trade-offs, cutting through a wide range of regulatory areas such as securities exchange rules, company law and bankruptcy law. Accordingly, providing a comprehensive quantification of the stance of regulation in these areas with a view to identifying best practice remains a challenge.

3.2.1 Construction of indicators

28. To assess the stance of securities market regulation in member countries, quantitative indicators have been derived using the *Doing Business Database* (2005) of the World Bank.[10] Four broad indices of securities market regulation have been used (details are included in Annex 1): contract enforcement, access to credit, investor protection and bankruptcy procedures. Each category is constructed from sub-indices which essentially reflect aspects of transparency (information disclosure) and efficiency of legal

9. Based on the 1999 Survey of banking regulation, the authors also looked at the impact of various regulatory variables on a measure of bank development in a set of OECD and non-OECD countries. Even though their regulatory indicators were defined and constructed somewhat differently, they also found restrictions on bank activities and foreign entry as well as government ownership to have a significant negative impact on the amount of bank credit to the private sector as a share of GDP, while restrictions on domestic entry did not.

10. Some of the indicators used from this publication are not strictly exogenous policy indicators but rather reflect the stance of policy to an important extent.

Table 1. Correlation between banking regulations and financial development

Structural Indicator	BANK ASSETS AS A SHARE OF GDP					PRIVATE CREDIT BY BANKS AS A SHARE OF GDP				
	I	II	III	IV	V	VI	VII	VIII	IX	X
Barriers to competition	-2.15** (0.04)					-1.69 (0.16)				
Domestic entry		-0.91 (0.19)					-0.03 (0.97)			
Foreign entry			-1.90* (0.05)					-1.10 (0.31)		
Activity				-1.10* (0.06)					-1.16* (0.08)	
Government Ownership					- 0.11 (0.86)					-0.32 (0.65)
Number of observations	29	29	27	29	27	29	29	27	29	27
R^2	0.15	0.06	0.14	0.12	0.00	0.07	0.00	0.04	0.11	0.01

Structural Indicator	BANK ASSETS AS A SHARE OF GDP										
	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI
Stability in banking regulation	-1.43** (0.04)										
Accounting standards		-0.06 (0.92)									
Auditing requirements			-0.03 (0.96)								
Capital adequacy				-0.13 (0.79)							
Liquidity & diversification					-0.32 (0.31)						
Provisioning						-0.68*** (0.00)					
Internal management							0.08 (0.65)				
Ownership								-0.85** (0.03)			
Discipline & enforcement									-0.76* (0.07)		
Deposit insurance										-0.51 (0.22)	
Supervisory structure											-0.11 (0.85)
Number of observations	29	29	29	29	29	29	29	29	29	29	29
R^2	0.15	0.00	0.00	0.00	0.04	0.34	0.01	0.16	0.12	0.06	0.00

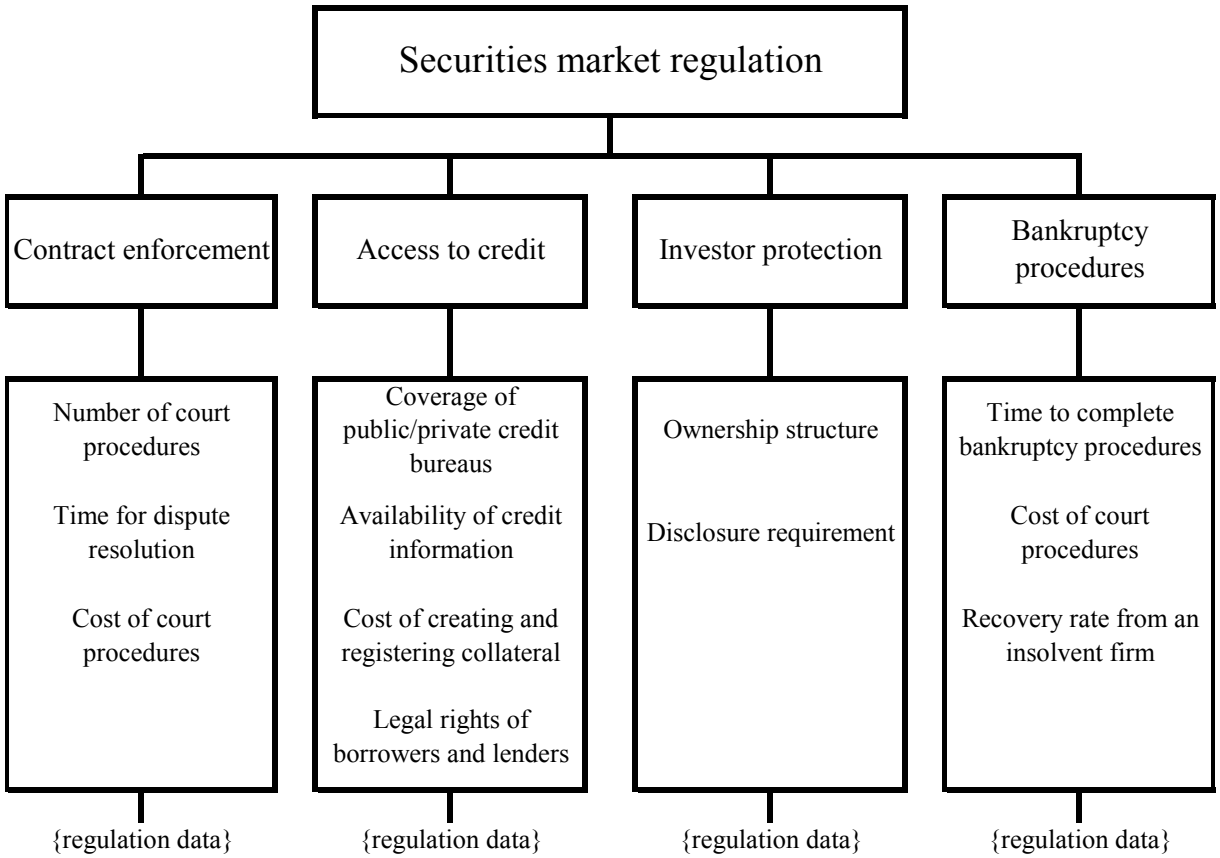
Note: Each column in barriers to competition and stability in banking regulation is a separate regression. Dependent variables for barriers to competition are bank assets as a share of GDP and private credit by banks as a share of GDP (average between 2000 and 2003). Dependent variable for stability is bank assets as a share of GDP. P-values are reported under the estimated coefficients. *, **, *** indicate significance at the 10, 5 and 1 per cent level respectively.

procedures (Figure 6).[11] For instance, the access to credit index combines information about the coverage of public registries and private bureaus with estimates of cost to create collateral and with information on the legal rights of lenders and borrowers. As was the case with banking regulation, all individual items have been converted into a quantitative index ranging from 0 to 1. In contrast to banking regulation, however, and given the emphasis put on investor/creditor protection and information standards, the indices have been constructed in such a way that a higher value is interpreted as being good for financial development and overall economic performance.

3.2.2 Results

29. The value of the overall index of securities market regulation is shown in Figure 7. As is the case in banking regulation, the mid-point (*i.e.* the white circle) shows the average index and the ranges shown in the shaded areas are calculated using the random weights technique. Compared with the results obtained in banking regulations, a larger set of countries (English-speaking countries as well as Norway, Japan, Iceland, Belgium and Finland) have significantly more demanding regulation (*i.e.* favourable to the development of securities markets) than the OECD average. By contrast, the indicator shows that Central and Eastern European countries, and other countries with relatively low values, have a regulatory stance that may discourage the development of securities markets.

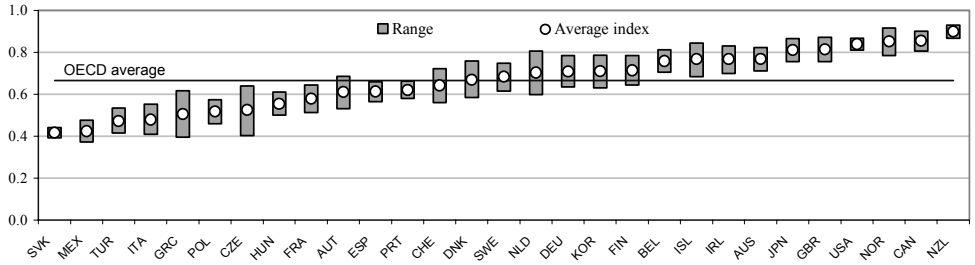
Figure 6. The system of regulatory indicators for securities markets



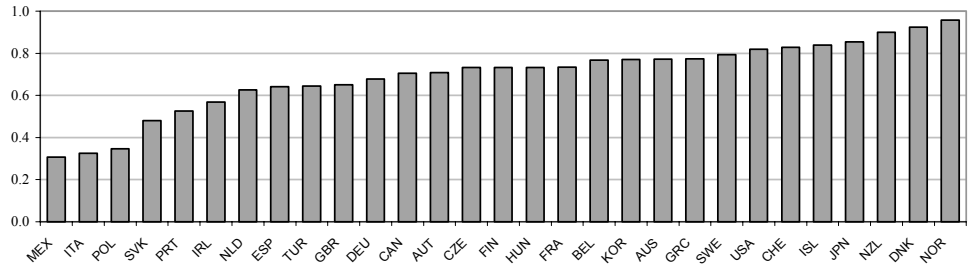
11. All the sub-indices are based on the version of *Doing Business* published in 2005 except the cost to create collateral which is based on the 2004 publication. Although these indicators are associated with securities markets they cover aspects of regulation for debt instruments in general, including bank loans.

Figure 7. Securities markets regulation indices

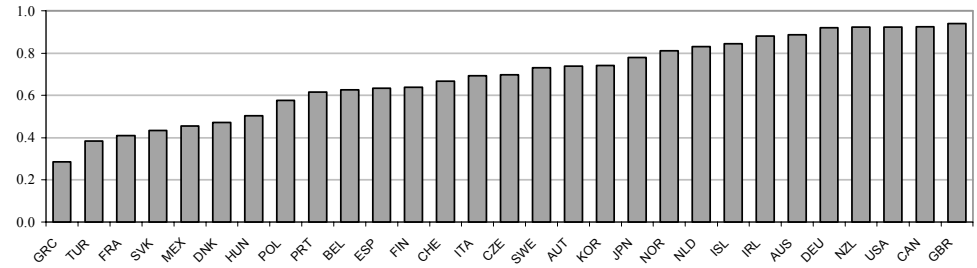
A. Overall securities market regulation[2]



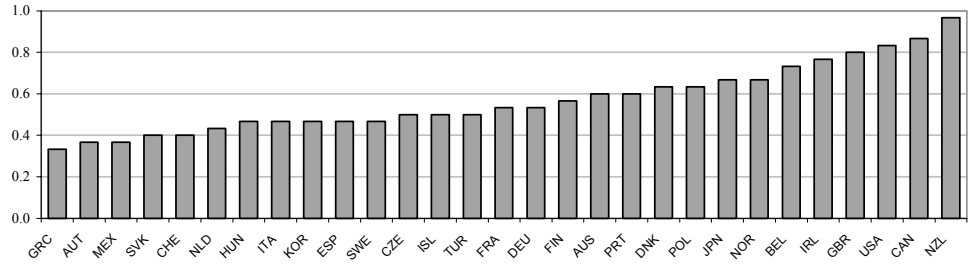
B. Contract enforcement



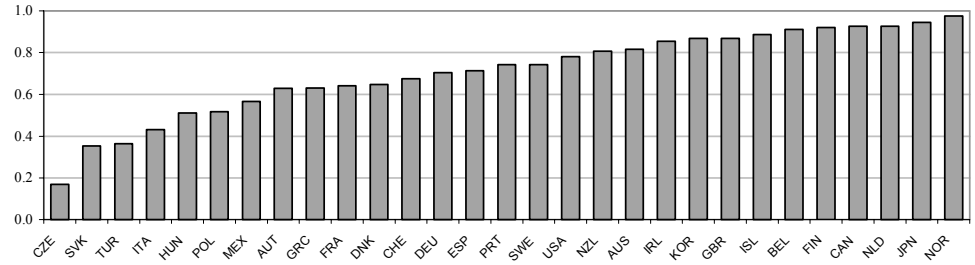
C. Access to credit



D. Investor protection



E. Bankruptcy procedures



1. The scale of the indicator is 0-1 from least to most demanding. A higher value indicates regulation that is more conducive to financial development.
2. Covers contract enforcement, access to credit, investor protection, and bankruptcy procedures.

Source: OECD and World Bank's bank regulation and supervision database.

30. The overall indicator of securities market regulation can be further decomposed into four broad sub-indices:

- *Contract enforcement*. Captures essentially the efficiency of commercial contract enforcement based on the number of procedures, the number of calendar days for dispute resolution and the official cost of court procedures.

- *Access to credit*. Captures two broad elements in assessing the ease of access to credit: the amount of credit information available through public registries or private bureaus; the strength of legal underpinnings in arranging collateral in protecting secured lenders.

- *Investor protection*. Captures the strength of minority shareholder protection against directors' misuse of corporate asset for personal gain from three perspectives: transparency of transactions, liability for self-dealing and shareholders' ability to sue directors for misconduct.

- *Bankruptcy procedures*. Captures the efficiency of bankruptcy laws and its proceedings with respect to the time required to go through the bankruptcy procedure, the overall cost of procedures and the recovery rate.

Overall, the stance of securities market regulations in different areas tends to be correlated in each country. Some G-7 countries (*e.g.* Canada, the United States and the United Kingdom) are relatively demanding in all areas, whereas Central and Eastern European countries tend to be fairly unrestrictive across the board.

3.2.3 Correlations of securities market regulations and financial developments

31. Correlation analysis underlines that across OECD countries the indicators of securities market regulation appear to be related to financial development (Table 2). To be more specific, stricter regulation is associated with higher stock market and private bond market capitalisation relative to GDP. At a lower level, significant influences of contract enforcement and bankruptcy procedures are found.

Table 2. Correlation between securities market regulations and financial development

Structural Indicator	STOCK MARKET AND PRIVATE BOND MARKET CAPITALISATION AS A SHARE OF GDP				
	I	II	III	IV	V
Securities market regulation	2.41*** (0.01)				
Contract enforcement		1.69** (0.03)			
Access to credit			1.33* (0.06)		
Investor protection				0.66 (0.43)	
Bankruptcy procedures					1.71*** (0.01)
Number of observations	29	29	29	29	29
R^2	0.22	0.16	0.13	0.02	0.24

Note: Each column is a separate regression. Dependent variable is the sum of stock market and private bond market capitalisation as a share of GDP (average between 2000 and 2003). P-values are reported under the estimated coefficients. *, **, *** indicate significance at the 10, 5 and 1 per cent level respectively.

3.3 Potentially important sources of inefficiencies not captured by indicators

32. Apart from the formal barriers discussed above, a number of less formal or non-legal obstacles contribute to maintaining inefficiencies in financial markets. While some of these obstacles may be "natural" such as language, culture or preferences, others may result from policy settings, including unfinished agendas for facilitating international trade and market integration. Some of the most significant policy areas can be regrouped according to the type of market instrument they are most directly related to:

- In the case of *retail banking services*, including bank loans to individuals and small and medium-sized enterprises, barriers to trade include the lack of harmonisation in consumer protection rules as well as in procedures for solving cross-border or cross-region disputes (Walkner and Raes, 2005). In addition, banks wishing to expand into neighbouring countries via foreign subsidiaries are generally subject to host-country supervision rules, implying multiple reporting. Even within countries, banks operating nationwide must in some member countries deal with multiple layers of supervisory authorities, often with different reporting requirements. Finally, even though substantial progress has been achieved in lowering formal barriers to cross-border mergers and acquisition, national authorities make sometimes excessive use of special control rights, company law provisions and prudential considerations to discourage foreign acquisitions.

- In the case of *equity markets*, a number of factors contribute to limiting the consolidation of stock exchanges as well as to raising the cost of cross-border securities transactions. These include differences in national corporate tax systems as well as in reporting and accounting standards, and, in some cases, the vertical ownership structure of stock exchanges. In some member states, investors/traders wishing to transact in several regions or provinces face higher costs owing to the presence of different securities exchange commissions.

- The development of the *private equity or venture capital market* is hampered in several countries by legal restrictions on holding of high-risk instruments by pension and/or mutual funds (Thompson and Choi, 2002). In addition, high capital gains taxes have been found to adversely affect venture capital development (Gompers and Lerner, 2004). Barriers to consolidation of secondary stock markets may also play a role, given the importance of exit prospects in attracting venture capital investment (OECD, 2003*a*).

- In the case of the *bond market,* a number of barriers have slowed the development of asset-backed securities including, in several cases, provisions from bankruptcy legislation requiring borrowers to be individually notified that the loan they contracted via a financial intermediary is being securitised, which raises the cost of such operation. The lack of sufficient information on the historical performance of the underlying assets may also be a contributing factor. More generally, the development of an integrated asset-backed securities market is hampered by cross-country differences concerning reporting regulations, rules on withholding taxes, income tax treatment of issuing vehicles and treatment of capital gains (Lumpkin, 1999).

4. The impact of financial systems development and policies on economic performance: Empirical evidence at the industry level

33. This section reports on the results from panel regression analysis linking a number of indicators of regulatory policy in the areas of banking competition and securities markets reviewed in the previous section, as well as measures of financial development and costs to broad measures of economic performance. As mentioned earlier, a large number of empirical studies have shown the importance of

financial systems development for growth at the aggregate level, but fewer have gone beyond standard measures of financial development and examined directly the impact of policy variables on performance at the sectoral level.

34. To the extent that important differences prevail across industries with respect to the use of external finance, using disaggregated data allows cross-section regression analysis to be performed over a larger and richer dataset.[12] Accordingly, the empirical investigation presented in this section is conducted on the basis of industry-level data, which are used to examine the effect of various policy indicators and measures of development on real value-added growth and labour productivity growth. In addition, given the importance of firm demographics on sector-level productivity (especially in high-technology sectors), the impact of financial development and policy on industry entry rates is also examined.[13]

4.1 Methodology and specification

35. The approach used to test whether regulations and the development of financial systems have a significant influence on economic growth follows closely the methodology introduced by Rajan and Zingales (1998). This methodology is based on the idea that firms' dependence on external sources of finance varies across industries according to differences in technology and characteristics such as the degree of capital intensity. For example, highly capital- and R&D-intensive industries may be more dependent on external funding due to large investment costs and longer periods before the profits can be harvested. Insofar as these differences across industries in the desired degree of external dependence are broadly similar across countries, this opens the possibility to test whether industries that depend more heavily on external funds grow faster in countries that have better-developed financial systems.

36. Concretely, this is done by interacting an industry-specific measure of external financial dependence with a country-specific indicator of financial development or regulatory policy such as those discussed in section 3. However, the *desired* amount of external financing in each industry is not observed and can only be inferred from the *actual* amount of funds raised externally. The latter is likely to be a good proxy for the former only where financial markets are sufficiently developed to provide firms with a largely unconstrained access to external financing. Following Rajan and Zingales, the assumption made is that US financial markets come closest to provide such access and accordingly, data on US listed firms can be used to identify industries' need of external finance. Each interaction term is then introduced as a potential determinant in separate regressions. In principle, it would have been desirable to include all the regulatory variables in a single regression allowing for statistical discrimination, but this was not feasible due to strong multicollinearity induced by the interaction with the measure of external financial dependence.[14]

37. This methodology is applied to examine the impact of financial systems' regulation and development on valued-added growth, labour productivity growth and firms' entry rates. In the first two cases, the analysis is conducted on a panel dataset with country and industry dimensions, using average growth rates over the 1994-2003 period. A time-series dimension is included in addition in the case of firm entry rates. The latter are defined as the number of entering firms divided by the total number of firms in a

12. It also allows controlling for the possibility that important sectoral shifts in the industrial structure may bias the results from macro data analysis.

13. See OECD (2003*b*). Even though studies have shown that existing firms contribute more importantly to productivity gains than new firms, high entry rates may contribute indirectly via competitive pressures on incumbent firms.

14. One way to partly circumvent this limitation would be to construct broad regulatory indicators using principal component analysis.

specific industry and are calculated on an annual basis over the period 1990-2001. The empirical analysis is based on the estimation of the following respective equations:

A) Industry growth

$$GROWTH_{c,i} = \alpha + \beta_1 INITIALSHARE_{c,i} + \beta_2 (X_c * EXDEP_i) + \gamma_1 Dcountry_c + \gamma_2 Dindustry_i + \varepsilon_{c,i} \quad (1)$$

B) Industry entry dynamics

$$ENTRY_{c,i,t} = \alpha + \beta_1 GAP_{c,t} + \beta_2 (X_c * EXDEP_i) + \gamma_1 Dcountry_c + \gamma_2 Dindustry_i + \gamma_3 Dyear_t + \varepsilon_{c,i,t} \quad (2)$$

where $GROWTH_{c,i}$ and $ENTRY_{c,i,t}$ are the dependent variables and refer to growth of value added or labour productivity and entry rates in industry *i* and country *c,* respectively. X_c stands for indicators of financial development and regulatory stances and the variable $EXDEP_i$ captures the measure of industries' dependence on external finance. The model for firm entry includes also the time dimension with sub-index *t*. Dummy variables for each country, industry and year are introduced to correct for country, industry and time specific effects. An industry's initial share of the total value added, $INITIALSHARE_{c,i}$, is used to control for potential convergence effects.[15] Finally, a measure of the output gap, $GAP_{c,t}$, is used to control for business fluctuations affecting firm entry.

38. The financial development and performance variables include an overall measure of size (sum of private credit and securities market capitalisation), venture capital, and overhead costs in the banking sector. As for policy indicators, they cover the two broad indices of securities market regulation and barriers to competition in banking, as well as some of their main sub-indices as defined in the previous section. While stability-oriented regulations have been excluded from the analysis reported, preliminary results indicated no statistically significant effects on such regulations on long-term performance. All the details concerning data sources, variable definitions and country and industry coverage are exposed in Annex 2.

4.2 Results

4.2.1 Base case results

39. Overall, the results for value-added growth and labour productivity growth provide further support to the view that financial systems matter for economic performance (Tables 3 and 4). Both the broad measures of financial depth, venture capital and overhead costs have a significant influence on the two growth measures, with the impact going in the expected direction. As for policy indicators, both the overall indices of barriers to banking competition and securities market regulation are found to impact significantly on valued-added and productivity growth. Taken at face value, this would suggest that policies improving contract enforcement, access to credit, the efficiency of bankruptcy procedures, or reducing barriers to entry and government control in the banking sector will foster labour productivity and value-added growth, in sectors most dependent on external finance.

15. Even though there is little reason *a priori* to expect a convergence phenomenon in industrial structure, relatively high growth rates may be observed more frequently in the case of smaller industries. To the extent that this is the case, such effect needs to be controlled for.

Table 3. Value-added growth, financial development and regulations: Empirical analysis

Panel regressions with country and industry dimensions: Average over 1994-2003

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Initial share	-0.19** (0.07)	-0.20** (0.08)	-0.18** (0.07)	-0.21*** (0.07)	-0.20*** (0.07)	-0.18** (0.07)	-0.19** (0.08)	-0.20*** (0.07)	-0.22*** (0.08)	-0.20*** (0.08)	-0.21*** (0.07)
Financial development*_EXDEP_	0.38*** (0.13)										
Venture capital*_EXDEP_		1.63*** (0.58)									
Overhead costs in banking*_EXDEP_			-21.99** (9.75)								
Market regulation*_EXDEP_				2.20*** (0.65)							
Contract enforcement**EXDEP*					1.52*** (0.55)						
Access to credit**EXDEP*						0.99** (0.49)					
Investor protection**EXDEP*							0.99** (0.49)				
Bankruptcy procedures**EXDEP*								1.33** (0.54)			
Barriers to banking competition *_EXDEP_									-3.03*** (0.86)		
Regulation on entry and activity**EXDEP*										-3.10** (1.30)	
Government ownership**EXDEP*											-1.08*** (0.33)
Number of observations	435	444	466	466	466	466	466	466	466	466	466
R^2	0.45	0.41	0.42	0.43	0.42	0.42	0.42	0.43	0.43	0.42	0.43

Notes: EXDEP variable in the interaction terms refers to industries' dependence on external finance. Financial development is a measured as the sum of private credit, stock market and private bond market capitalisation to GDP. All regressions include country and industry dummies. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at 10, 5, and 1 per cent level, respectively.

Source: OECD.

Table 4. Productivity growth, financial development and regulations: Empirical analysis

Panel regressions with country and industry dimensions: Average over 1994-2003

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Initial share	-0.15 (0.09)	-0.15* (0.08)	-0.14* (0.08)	-0.17** (0.08)	-0.16** (0.08)	-0.15* (0.08)	-0.16* (0.08)	-0.16** (0.08)	-0.19** (0.08)	-0.17** (0.08)	-0.18** (0.08)
Financial development*_EXDEP_	0.36*** (0.10)										
Venture capital*_EXDEP_		0.93** (0.47)									
Overhead costs in banking*_EXDEP_			-20.50** (9.82)								
Securities market regulation*_EXDEP_				1.96*** (0.56)							
Contract enforcement**EXDEP*					1.32*** (0.50)						
Access to credit**EXDEP*						0.81** (0.41)					
Investor protection**EXDEP*							1.16*** (0.43)				
Bankruptcy procedures**EXDEP*								1.13*** (0.36)			
Barriers to banking competition *_EXDEP_									-2.90*** (0.58)		
Regulation on entry and activity**EXDEP*										-3.43*** (1.15)	
Government ownership**EXDEP*											-0.96*** (0.22)
Number of observations	394	423	423	423	423	423	423	423	423	423	423
R^2	0.45	0.42	0.42	0.43	0.42	0.42	0.42	0.42	0.43	0.43	0.43

Notes: *EXDEP* variable in the interaction terms refers to industries' dependence on external finance. Financial development is a measured as the sum of private credit, stock market and private bond market capitalisation to GDP. All regressions include average country and industry dummies. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at 10, 5, and 1 per cent level, respectively.

Source: OECD.

40. Turning to the impact on firms' entry rates, the results are broadly in line with those for value added and labour productivity growth, although the degree of significance is generally somewhat weaker (Table 5). One difference is that venture capital is no longer significant. Another difference is that the impact of barriers to banking competition relative to that of securities market appears to be larger than in the case of productivity and value-added growth. This finding is consistent with the view that new and small firms tend to rely more heavily on bank financing and thus regulation on this sector may have a stronger effect on such firms. Perhaps more importantly, the negative impact of barriers to competition in banking on firm entry contradicts the view according to which greater market power in banking may facilitate entry by providing easier access to credit for young and unknown firms (Peterson and Rajan, 1995).

41. Even if the statistical analysis supports the importance of the financial development and regulatory variables, they explain only a small fraction of the variance in sectoral value-added and productivity growth, as well as of entry rates. Indeed, these variables account for one to two per cent of the total variance, the country, industry and (in the case of entry rates) time fixed effects accounting for almost all of the multiple correlation coefficients (R^2) of the regressions. Nonetheless, since the variation is quite large, the financial development and regulatory indicators are of significant quantitative importance. For instance, based on the empirical estimates reported above, a one standard-deviation increase in financial development would lead on average to an increase in the growth rate of value-added or productivity in the business sector of a magnitude varying roughly from 0.2 to 0.5 percentage points (depending on the averaging method), while the impact on entry rates would range between 0.4 and 0.7 percentage points (Table 6). Improvements in the stance of banking regulations equivalent to one standard deviation would be associated with increases in growth and entry rates of similar magnitudes, whereas the impact of securities market regulation is somewhat lower.

42. The findings reported in this section are broadly in line with the few empirical papers looking at the growth and finance nexus from a sector-level perspective. For instance, the results on industry growth confirm the findings of the work by Rajan and Zingales (1998) and the more recent study by Guiso *et al.*, (2004) that analyses growth in the EU countries.[16] The research at the industry level has mostly focused on value added growth and the finding that productivity growth is also positively affected by financial development provides further evidence on the relationship between finance and growth. A couple of studies examine the effects of financial development on firm entry (Klapper, Laeven, and Rajan, 2004; Vartia, 2005) and their results are consistent with those reported in this study. Beck, Demirguc-Kunt, Laeven and Levine (2004) also find that small firms are particularly affected by financial development, in line with the above results on entry since entering firms generally tend to be small.

4.2.2 Robustness tests

43. In order to test the robustness of the findings on value-added and productivity growth and firm entry reported above, a number of sensitivity tests were carried out. In particular, the sensitivity to important omitted variables from the baseline regressions is tested. In the analysis of industry growth

16. These studies focus on manufacturing whereas the current study includes also services sectors. In addition, this study uses the indicator of industries' dependence of external finance that is computed using data from 1990-2003 whereas the previous studies have used the data from the 1980's.

Table 5. Entry rates, financial development and regulations: Empirical analysis

Panel regressions with country, industry and time (1990-2001) dimensions

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Financial development*_EXDEP_	0.58*** (0.21)										
Venture capital*_EXDEP_		-0.28 (0.81)									
Overhead costs in banking*_EXDEP_			-33.21** (13.73)								
Securities market regulation*_EXDEP_				2.15* (1.22)							
Contract enforcement*_EXDEP_					1.55* (0.91)						
Access to credit*_EXDEP_						1.24 (0.80)					
Investor protection*_EXDEP_							0.73 (0.83)				
Bankruptcy procedures*_EXDEP_								1.73** (0.87)			
Barriers to banking competition *_EXDEP_									-3.39*** (1.22)		
Regulation on entry and activity*_EXDEP_										-4.73*** (1.77)	
Government ownership*_EXDEP_											-0.91** (0.41)
Number of observations	1995	1950	2170	2170	2170	2170	2170	2170	2170	2170	2170
R^2	0.63	0.65	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63

Note: EXDEP variable in the interaction terms refers to industries' dependence on external finance. Financial development is measured as the sum of private credit, stock market and private bond market capitalisation to GDP. All regressions include country, industry, and year dummies and output gap to control for business cycles in each country. Cluster corrected standard errors are reported in parentheses. *, **, and *** indicate significance at 10, 5, and 1 per cent level, respectively.
Source: OECD.

Table 6. Effect of a one standard-deviation change in the indicators of financial development and regulation

Panel A Value added growth		
	Simple average effect[1]	Weighted average effect[2]
Financial development	0.27	0.48
Venture capital	0.18	0.31
Overhead costs in banking (decrease)	0.20	0.34
Market regulation	0.24	0.42
Barriers to banking competition (decrease)	0.29	0.52
Panel B Labour productivity growth		
	Simple average effect[1]	Weighted average effect[2]
Financial development	0.25	0.45
Venture capital	0.10	0.18
Overhead costs in banking (decrease)	0.18	0.32
Market regulation	0.21	0.37
Barriers to banking competition (decrease)	0.28	0.49
Panel C Firm entry		
	Simple average effect[1]	Weighted average effect[2]
Financial development	0.41	0.66
Overhead costs in banking (decrease)	0.30	0.48
Market regulation	0.24	0.38
Barriers to banking competition (decrease)	0.34	0.53

1. Calculated as a simple average of the effect on each industry.
2. Calculated as a weighted average of the estimated effect on each industry, with the weights being based on the average share across countries of respective industries in total business sector value added.

Source: Authors' calculations.

three additional variables are introduced to the baseline regressions (Tables 3 and 4; specifications IV and IX). These are *i*) the rate of change of the industry-specific regulation-impact indicator[17], *ii*) industry investment growth and *iii*) industry R&D intensity.

44. The results on the effects of financial regulation seem to be relatively robust to the inclusion of these variables (see Table 7). The estimated coefficients of investment growth, R&D intensity and change in the regulation impact indicator have the expected signs. However, only the regulation indicator and investment growth have statistically significant effects on value-added and productivity growth. Including the measure of regulation impact also reduces to some extent the statistical significance of the effect of banking competition regulation on labour productivity growth.

45. In the case of firm entry the robustness analysis was carried out using industry value-added growth and R&D intensity as control variables (not shown on Table). Of these, only R&D intensity was statistically significant and in neither cases were the basic results affected. On the other hand, the significance of the basic results turned out to be sensitive to the inclusion of the industry-specific regulation impact indicator, but in this case the sensitivity of results was due to the exclusion of Hungary and Mexico for which no data on the regulation impact were available. One reason for this sensitivity is that firm entry regressions are performed over a smaller set of countries than value-added and productivity growth regressions. In such a case, the exclusion of Hungary and Mexico reduces considerably the cross-country variations in the banking and securities market regulation indicators. In contrast, the results from value-added and productivity growth regressions are not sensitive to the exclusion of these countries.

4.2.3 Results on firm turnover

46. So far, the analysis of firm demographics focused on entry rates. However, several studies have shown that both entry of new firms and market exit of old firms contribute to the productivity growth through a process of creative destruction where new firms replace less productive firms.[18] Thus, it is not only the new firms that promote aggregate productivity growth but also industry dynamics in general. Accordingly, this sub-section extends the analysis of the main text by looking at the impact of financial system development and regulation on firm turnover rates in different industries.

47. The results of the effects of financial development and regulation on firm turnover are largely similar to the findings on firm entry (see Table 8). There is a clear positive relationship between firm turnover and financial development, measured as the ratio of the sum of private credit and securities market capitalisation to GDP. Moreover, overhead costs, capturing the efficiency of the financial system, have a strong negative effect on the turnover. These findings support the view that well-developed financial systems enhance reallocation of capital from low-productivity projects to high-productivity projects so that some firms are forced to exit. Financial development may, in this regard, be seen as enhancing the process of creative destruction.

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17. See Conway *et al*. (2006). This variable is calculated using indicators of regulatory conditions in major network industries and estimates of the importance of these industries as intermediate inputs in the production process.

18. The theoretical studies in this field include models with learning processes (see e.g. Jovanovic (1982) and Pakes and Erikson (1998)) and uncertainty as well as embodied and vintage technology (see e.g. Cooper, Haltiwanger and Power (1997) and Campell (1997). See Schumpeter (1934) for the original formulation of the idea and Aghion and Howitt (1992) and Caballero and Hammour (1994) for more recent theoretical work. For empirical evidence on the role of creative destruction, see Scarpetta *et al.* (2002) and the results of the OECD Growth Project reported in OECD (2003*b*).

Table 7. Financial regulation on growth: sensitivity to the inclusion of additional variables

	Panel A Effects of securities market regulation					
	Value-added growth			Labour productivity growth		
	I	II	III	IV	V	VI
Initial share	-0.03	-0.19**	-0.20***	-0.07	-0.18**	-0.16**
	(0.05)	(0.09)	(0.08)	(0.07)	(0.08)	(0.08)
Securities market regulation*_EXDEP_	1.23**	1.88**	1.98***	1.32**	1.85***	1.64***
	(0.58)	(0.76)	(0.69)	(0.54)	(0.56)	(0.55)
Relative change in industry regulation (1994-2003)	-15.48*			-29.49***		
	(9.33)			(11.43)		
Investment growth		4.09***			1.74	
		(1.28)			(1.44)	
R&D intensity			1.82			6.15
			(5.23)			(4.20)
Number of observations	369	382	437	357	372	398
R^2	0.56	0.44	0.42	0.50	0.48	0.42

	Panel B Effects of banking competition regulation					
	Value-added growth			Labour productivity growth		
	I	II	III	IV	V	VI
Initial share	-0.03	-0.20**	-0.22***	-0.07	-0.19**	-0.18**
	(0.06)	(0.09)	(0.08)	(0.07)	(0.08)	(0.08)
Barriers to baking competition*_EXDEP_	-1.74**	-2.02**	-2.95***	-1.56*	-2.27***	-2.50***
	(0.77)	(0.91)	(0.90)	(0.85)	(0.64)	(0.62)
Relative change in industry regulation (1994-2003)	-14.63			-28.42**		
	(9.32)			(11.43)		
Investment growth		4.10***			1.70	
		(1.28)			(1.45)	
R&D intensity			1.38			5.70
			(5.08)			(4.14)
Number of observations	369	382	437	357	372	398
R^2	0.56	0.44	0.43	0.50	0.48	0.42

Notes: *EXDEP* variable in the interaction terms refers to industries' dependence on external finance. All regressions include country and industry dummies. Robust standard errors are reported in parentheses. *, **, and *** indicate significance at 10, 5, and 1 per cent level, respectively.
Source: OECD

Table 8. Effects of financial regulation on industry turnover rates

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
Financial development*_EXDEP_	1.02** (0.40)										
Venture capital*_EXDEP_		-0.57 (1.68)									
Overhead costs in banking*_EXDEP_			-61.59** (27.63)								
Securities market regulation*_EXDEP_				3.87* (2.32)							
Contract enforcement*_EXDEP_					2.90 (1.85)						
Access to credit*_EXDEP_						2.47* (1.41)					
Investor protection*_EXDEP_							1.10 (1.50)				
Bankruptcy procedures*_EXDEP_								3.19** (1.60)			
Barriers to competition *_EXDEP_									-5.75** (2.34)		
Regulation on entry and activity*EXDEP										-7.96** (3.25)	
Government ownership*EXDEP											-1.55** (0.73)
Number of observations	1836	1791	2011	2011	2011	2011	2011	2011	2011	2011	2011
R^2	0.61	0.63	0.62	0.62	0.62	0.62	0.61	0.62	0.62	0.62	0.61

Notes: EXDEP variable in the interaction terms refers to industries' dependence on external finance. Financial development is a measured as the sum of private credit, stock market and private bond market capitalisation to GDP. All regressions include country, industry, and year dummies and output gap to control for business cycles in each country. Cluster corrected standard errors are reported in parentheses. *, **, and *** indicate significance at 10, 5, and 1 per cent level, respectively.

Source: OECD

48. The effect of financial regulatory indicators is also similar to that observed in the case of firm entry. The overall index of securities market regulation has statistically significant positive effect on firm turnover. However, among the sub-indices only regulations on access to credit and business closures are statistically significant. When focusing on the regulatory measures of banking competition, the results suggest that they have an important role in explaining industry turnover. The higher the regulation, and thus the lower the competition, the less firm turnover there is likely to be.

5. Conclusions

49. This paper has used industry-level data from over 20 OECD countries to examine whether industries that rely more heavily on external sources of funds grow more rapidly in countries where regulation allows for stronger competition in markets for banking services and financial instruments. In the case of banking, regulatory impediments to competition focus essentially on barriers to entry (both foreign and domestic), on lines-of-business restrictions and on the scope of government ownership. As for markets for debt and equity instruments, the regulatory indicators cover the following four areas: contract enforcement, access to credit, investor protection and bankruptcy procedures.

50. Using panel regression techniques, the results indicate that financial system regulation has a statistically significant influence on output and productivity growth as well as on firm entry, *via* the impact on industrial sectors relying more heavily on external sources of funding. The economic impact is also found to be substantial enough to matter, yet sufficiently small to remain credible.

51. Regulatory indicators show that member countries have at least in the past adopted different approaches to regulate banking and securities, with less significant differences found in the former case, where most countries were found to lie within a fairly narrow range around an intermediate position with respect to competition-restraining regulations. As regards the market for debt and equity, more variations was observed in the extent to which regulation is either more friendly to investors/lenders or significantly less so, as compared to the OECD average.

52. Despite moves to liberalise financial markets in the past, there is some indication that the degree of competition in banking has been kept weak in several member countries, especially in retail markets. The OECD countries that are characterised by strong competition in banking activities have not been subject to instability in recent decades. Weak competition in other countries cannot therefore be justified on the basis that this has fostered greater stability. One reason why stronger competition may not risk greater instability is that the authorities have refined the tools to foster prudent behaviour with less adverse impact on competition.

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ANNEX 1. INDICATORS OF STRUCTURAL POLICIES IN FINANCIAL SYSTEMS

1. This annex provides details on the sources and coverage of the regulatory indicators used in the empirical analysis. The basic information used to develop the indicators comes essentially from two World Bank sources: the *Bank Regulation and Supervision Database* (Barth, Caprio and Levine, 2001 and 2004, henceforth BCL); and the *Doing Business Database* (World Bank, 2005)

A1.1 Bank Regulation and Supervision Database

2. In 1998, the World Bank initiated a survey and created a database on the regulation and supervision. Covering 107 countries including all OECD countries, the purpose of this database is to collect comprehensive information on the regulation and supervision of commercial banks. Since then, a second round of the survey was conducted in 2003, and the results from that survey serve as a basis for this paper's analysis.

A1.1.1 General methodology

3. The survey consists of approximately 250 questions in 12 sub-groups, each of which highlights specific aspects of banking regulation and supervision. They are namely entry requirements into banking, ownership structure, capital adequacy, banking activity, external auditing requirements, internal management, liquidity and diversification requirements, depositor protection, provisioning requirements, accounting and information disclosure requirements, discipline and problem institutions exit, and supervisory structure.

4. Many responses in the survey are of the yes/no type, and indicators constructed from the database are the simple aggregation of answers relevant for each indicator. In order to check the accuracy of information collected in the survey, BCL and World Bank staff have interacted with national authorities and cross-checked the information with other databases covering the same type of information. In particular, the information with respect to deposit insurance is compared with those collected by the Office of the Comptroller of the Currency (OCC) in the US, and the Financial Stability Forum.

A1.1.2 Indicators

5. While BCL constructed their own indicators by re-grouping questions in different sub-groups, the analysis conducted here is broadly in line with the classification of the original database. An attempt has been made to distinguish those that have more direct implications on competition in banking from those primarily aimed at preserving stability of the banking system.

Competition

Domestic entry index

6. This index gathers information about licensing requirement of setting up a bank in each country. The requirement may range from drafting by-laws and preparing financial projections to collecting background information of executive members and disclosing sources of capital. The index also contains

information about regulatory structure in granting licenses. Most countries require quite extensive documentation.

Foreign entry index[1]

7. This index shows how restrictive it is for foreign entities to enter domestic banking system. First, it examines restrictions on foreign ownership in the form of limits on the share of banks' equity that can be held by non-residents. Second, it looks into screening and approval procedures of foreign entry, including requirements to show economic benefits of foreign takeover. Third, other formal barriers such as restrictions on the membership of the board of directors and the employment of foreign nationals are examined.

Bank activity index

8. This index shows the level of regulatory restrictiveness for bank participation in securities activity (ability of banks to engage in the business of securities underwriting, brokering, dealing, and mutual fund operations), and insurance activity (ability of banks to engage in insurance underwriting and selling). Each activity is categorised into four levels: unrestricted (a full range of activity can be conducted directly), permitted (a full range of activity can be conducted, but all or some must be conducted *via* subsidiaries), restricted (less than full activity can be conducted directly or *via* subsidiaries), and prohibited (activity cannot be conducted either directly or *via* subsidiaries). Securities activity is most liberal, while insurance activity remains most restrictive in many countries.

Government ownership index

9. This index measures the amount of assets held by banks (among the ten largest) where government ownership is at least 20% as a ratio of total assets (of the ten largest banks). This index does not reflect competition arrangements *per se*, but it is an important indicator that proxies the extent to which competition might be distorted by the existence of government-owned entities. The measure is taken from La Porta *et al.* (2002) and applies to 1995.

Stability

Accounting standards index

10. This index captures the structure of financial statements. They include questions such as whether banks are required to produce consolidated accounts including their subsidiaries, or whether off-balance sheet items are disclosed. The index also includes information about the use of rating agencies, and how accounting information is used for supervisory purposes.

Auditing requirements index

11. As is case for accounting standards, this index is designed to capture the practice of external auditing, and how auditing information is incorporated in supervision. It not only examines whether external auditing is compulsory for banks but also how the relationship between auditors and supervisors is structured under the regulatory framework.

1. This sub-index as well as the one for government ownership, come from separate sources, namely Golub (2003) and La Porta *et al.* (2002), respectively.

Capital adequacy index

12. Capital adequacy is at the core of prudential regulation. This index intends to collect information about the consistency of capital requirement with the Basel guidelines. It examines whether the capital adequacy ratio varies as a function of credit risk and market risk. Also it incorporates what is allowed for, or deducted from, capital such as subordinated debt, unrealised losses in securities portfolio, and unrealised losses from foreign exchange transactions.

Liquidity and diversification index

13. The index summarises the reserve requirement and guidelines for asset diversification. In the former, the questions focus on the minimum requirement and the types of assets allowed for reserves. As regards asset diversification, the main question concerns whether there exists explicit, verifiable, and quantifiable guidelines.

Provisioning requirements index

14. This index concerns non-performing assets, *e.g.* whether there is a formal definition of non-performing assets and how its classification works in case of a customer in arrears.

Internal management index

15. The index summarises regulators' enforcement power to engage in bank's internal management. It is based on answers to two questions: can the supervisory authority force a bank to change its internal organisational structure and has this power been utilised in the last 5 years.

Ownership index

16. This index collects information about the capital structure of banks. It incorporates answers to questions as to whether there is a maximum percentage of bank capital that can be owned by a single owner, whether related parties of a bank can own capital in the bank. Furthermore, the index shows the level of regulatory restrictiveness for non-financial firms and non-bank financial firms (*e.g.* insurance companies, finance companies) to own shares in commercial banks. The restrictiveness is divided into four levels: unrestricted (firms may own 100% of equity in a bank), permitted (unrestricted albeit subject to prior authorisation or approval), restricted (limits are placed on ownership, such as a maximum percentage of a bank's capital or shares), and prohibited (no equity investment in a bank).

Discipline and enforcement index

17. The index shows how much enforcement power regulators can exercise against banks as part of supervisory activity. It covers a broad array of supervision enforcement methods from cease-and-desist orders and suspension of directors' decision to distribute dividends, bonuses, and management fees, to supervisors' power to supersede shareholder rights, to replace directors, to forebear certain regulations, and to insure liabilities beyond deposit insurance scheme under bank restructuring and reorganisation.

Deposit insurance index

18. This index covers the structure of deposit insurance. First it concerns the existence of an explicit deposit insurance protection system and second it incorporates information about funding structure (whether premium is paid by banks, governments, or both; whether premium reflects the authorities' assessment of bank risk), limitation of coverage (whether there is a limit per person; whether there exists co-insurance mechanism), management of insurance funds (whether funds are managed by public entities,

private entities, or both), and legal power of the deposit insurance authority (whether the authority can make a decision to intervene in a bank; and whether the authority can cancel or revoke insurance for any participating banks).

Supervisory structure index

19. This index summarises the organisation structure of supervisory authorities. It includes the number of supervisors, the frequency of on-site examination, and the liability of supervisors. With regard to the authorities' accountability and independence, the index incorporates information about to whom the supervisory agencies are accountable, how the head of the agencies is appointed, whether the head has a fixed term in office, and whether the head can be removed.

A1.2 Doing Business Database

20. The World Bank started the *Doing Business Database* in 2004, covering 145 countries and updating annually. Among OECD countries, however, Luxembourg is not covered, and Iceland was only added in the most recent publication. The purpose of the database is to record the scope and manner of regulations that enhance or constrain business activity. More concretely, it aims to identify obstacles faced by an entrepreneur who attempts to perform a variety of business tasks such as starting and/or closing a business, hiring and firing workers, registering a property or getting credit. It also assesses the stance of investor protection and contract enforcement.

21. Given the focus of this paper on the role of regulation on financial system efficiency, the following four indices, updated in early 2005, were considered in the empirical analysis: access to credit, investor protection, contract enforcement, and bankruptcy procedures. While some of the components are measured on a different scale, all indices have been re-defined on a scale of 0 to 1.

A1.2.1 General methodology

22. The database is based on factual information about laws and regulations. For most indices, the information is collected on the basis of concrete - albeit hypothetical - situations meant to illustrate potential real-life cases such as that of a conflict of interest involving a firm's controlling shareholder (investor protection), overdue debt payments (enforcing contract) or a business failure (bankruptcy procedures). In each case, several assumptions underlying these hypothetical situations are specified so as to facilitate cross-country comparisons. While the methodology itself was developed in a series of academic papers, it has benefited from input and verification by a number of government officials, lawyers, business consultants and other professionals in order to ensure accuracy of information.[2] Between the World Bank team and local experts, information was reviewed and discussed for refinement.

2. The original methodology for deriving each index comes from the following academic papers. The *contract enforcement* index is based on Djankov *et al*. (2003); the *access to credit* index is based on Djankov, McLiesh and. Shleifer (2005); the *investor protection* index is based on Djankov, La Porta and Shleifer (2005); the *bankruptcy procedures* index is based on Djankov *et al*. (2005).

A1.2.2 Indicators[3]

Contract enforcement index

23. This index captures the efficiency of commercial contract enforcement based on the following three indicators.

- Number of procedures: Mandated by law or court regulation, it counts the number of mandated interactions between parties, or between them and the judge or court officer.

- Time: Number of calendar days for dispute resolution from the moment of the lawsuit by the plaintiff until the moment of settlement.

- Official cost: Cost of court procedures including court costs and attorney fees, expressed as a percentage of the debt.

Access to credit index

24. Getting credit from financial intermediaries has often been regarded as the biggest obstacle, in particular for small businesses. This index intends to capture two important elements in assessing the ease of access to credit: first, how much credit information is available; and second, how strong the legal underpinnings are in arranging collateral as well as in protecting secured lenders. The intuition behind this is that broader sharing of credit information and better protection of legal rights in and out of bankruptcy can facilitate more credit flows to businesses.

25. To be more specific, the index is constructed from two components: one concerns the coverage, scope, quality and accessibility of credit information available either through public or private credit registries, and the other concerns the cost to create and register collateral as well as legal rights of borrowers and lenders.

Credit information sharing

26. This component is built in two stages: first, to check whether public and/or private credit bureaus are present; and second, to collect information about the structure (market coverage, data access and quality) and legal framework of the registries.

- Coverage of public registries: The number of borrowers (individuals and firms) listed in the registry with information on repayment history, unpaid debts, or credit outstanding. The coverage is 0, if no public registry exists.

- Coverage of private bureaus: The number of borrowers listed in the private firm or non-profit organisation with the same types of information as included in public registries. The coverage is 0, if no private bureau exists.

- Credit information availability: The index assesses the availability of credit information at public or private bureaus, based on the following 6 features: *i*) both positive and negative information is distributed, *ii*) data on firms and individuals are distributed, *iii*) data from retailers to financial institutions are distributed, *iv*) more than 2 years of historical data is preserved, *v*) data on loans

3. The description of indices reported in this section follows closely the documentation available on the *Doing Business* website.

of above 1% of income per capita is distributed, and *vi*) borrowers have the right to access their data. A score of 1 is added to the index or each affirmative answer, implying that higher values indicate more information available through credit bureaus.

Collateral and legal rights

27. This component aims to capture how costly it is to register collateral when seeking a loan, and how well collateral and bankruptcy laws facilitate lending.

- Cost to create and register collateral: Based on research of collateral and insolvency laws, lawyers are asked to estimate costs in the following standardised scenario – a medium-sized entrepreneur in textile business seeks a loan in order to purchase industrial sewing machines which will be pledged as collateral. The costs include taxes, notary fees and duties associated with creating the security right and registering it in the collateral registry, scaled as a percentage of income per capita.

- Legal rights of borrowers and lenders: The index measures the degree to which bankruptcy and collateral laws facilitate lending. In bankruptcy laws, 3 features are identified: *i*) secured creditors can seize collateral when a debtor enters reorganisation (no asset freeze), *ii*) secured creditors are paid first in the process of liquidating a bankrupt firm, and *iii*) an administrator is responsible for managing the business during reorganisation, rather than managers of a bankrupt firm. In collateral laws, 7 features are identified: *i*) general description of assets is permitted in collateral agreements, *ii*) general description of debt is permitted in collateral agreements, *iii*) any legal/natural person may grant/take security, *iv*) a registry including charges over movable property operates, *v*) secured creditors have priority outside of bankruptcy, *vi*) parties may agree on contractual enforcement procedures, and *vii*) creditors may seize/sell collateral out of court. A score of 1 is added to the index for each affirmative answer, meaning that higher values indicate stronger protection of legal rights.

Investor protection index

28. This index captures the strength of minority shareholder protections against directors' misuse of corporate assets for personal gain from three perspectives; transparency of transactions, liability for self-dealing, and shareholders' ability to sue directors for misconduct. It relies on the following stylised scenario. The business, a publicly traded corporation, has a board of directors and the CEO who has the legal capacity to act on behalf of the corporation. One controlling shareholder who is also a member of the board owns another company that has idle assets. This shareholder proposes that the corporation purchases the idle assets from his other company at an unfair price, a classic case of conflict of interest. Even though all the transactions are made under compliance of disclosure requirements, minority shareholders sue the board.

- Disclosure: The index assesses the extent of disclosure, based on the following 5 features: *i*) what corporate body can provide legally sufficient approval for the transaction, *ii*) whether immediate disclosure to the public and the shareholders is required, *iii*) whether disclosure in the annual report is required, *iv*) whether disclosure by this controlling shareholder to the board is required, and *v*) whether an external body is required to review the transaction before it takes place.

- Director liability: This index examines the extent of director liability, based on the following 7 features: *i*) a plaintiff's ability to hold this shareholder liable for damages to the company, *ii*) a plaintiff's ability to hold the approving body liable for damages, *iii*) a plaintiff's ability to void the transaction, *iv*) whether this shareholder pays damages for the harm caused to the company,

v) whether he repays profits made from the transaction, *vi*) whether fines and imprisonment can be applied against him, and *vii*) the ability of minority shareholders to sue for damages.

- Shareholder suits: This index measures the ease of shareholder suits, based on the following 6 features: *i*) the range of documents available to a plaintiff during trial, *ii*) whether a plaintiff has the ability to directly examine the defendant and witnesses, *iii*) whether he can obtain any documents from the defendant without identifying them specifically, *iv*) whether minority shareholders can request an inspector, *v*) whether they have the right to inspect the transaction documents before filing suit, and *vi*) whether the standard of proof for civil suits is lower than that for a criminal case.

Bankruptcy procedures index

29. This index identifies the efficiency of bankruptcy laws and its proceedings, on the basis of the following hypothetical scenario. A business, having contracted bank loans to buy a hotel, faces liquidity problems and defaults on its loans. Since too many creditors are involved for a renegotiation, the options are either to reorganisation or liquidation. It is based on the following three indicators.

- Time: Measured in calendar years, it counts the average time necessary to complete the sequence of a bankruptcy procedure.

- Cost: Costs of court procedures, fees of insolvency practitioners, lawyers, accountants, *etc*, expressed as a percentage of the estate value of the bankrupt business. Respondents are to choose among the following options: 0-2%, 3-5%, 6-8%, 9-10%, 11-18%, 19-25%, 26-33%, 34-50%, 51-75% and more than 75%.

- Recovery rate: It estimates how many cents on the dollar claimants (creditors, tax authorities, and employees) recover from an insolvent firm, taking into account whether a firm is kept as a going concern, how much the official costs of the insolvency procedures are, and how much the value is discounted due to the time spent on closing down a business.

ANNEX 2. DATA COVERAGE, SOURCES AND DEFINITIONS

1. This annex describes the different datasets and definitions used in the econometric analysis. (See Box 1 for data description.) In addition, it provides descriptive statistics on the main variables used in the analysis and on the measure of industries' dependence on external finance.

2. The empirical analysis examines the effects of financial systems' development and regulation on economic growth and firm demographics at the industry level. The endogenous variables at the industry level are the growth rates of real value added and labour productivity, defined as real value added divided by the number of employees in a given industry, as well as firm entry and turnover. Table A2.1 reports the summary statistics of these variables.

Box 1. Data source and construction: summary

1) Value-added and labour productivity growth: industry level

Period of analysis: 1994-2003.
Dimensions:

- 26 countries (value-added growth) and 24 countries (labour productivity growth)
- 22 industries

Endogenous variables: average real value-added and labour productivity growth rates.
Construction method: industry growth rates are computed as geometric averages over the period.
Source: OECD STAN database.

Measure of dependence on external finance
Construction method: A firm's dependence on external finance is defined as its capital expenditure minus internal funds (cash flow from operations) divided by capital expenditure. To obtain the industry-wide measure, the firm-level ratios of external dependence are averaged first over time and then aggregated across firms in each industry.
Source: Thomson Financial Worldscope database.

Control variables (industry level): Initial share (year 1994) of each industry in business sector value added, average rate of change in the indicator of regulation impact, investment growth and R&D intensity.
Construction method: control variables are computed as simple annual averages over the period.
Source: OECD STAN database and Conway *et al*., 2006.

2) Firm demographics: industry level

Period of analysis: 1990-2001.
Dimensions:

- 16 countries
- 25 industries
- varying time spans within the 1990-2001 sample depending on each country

Endogenous variables: firm entry and turnover rates.
Source: OECD firm-level database, Eurostat Structural Business Statistics database, World Bank and Statistics New Zealand.
Construction method: entry rate is defined as the number of entering firms as a per cent of the total number of firms and firm turnover rate is defined as the sum of entering and exiting firms as a per cent of the total number of firms.

Control variables: output gap, indicator of regulation impact, industry R&D intensity and value-added growth.
Source: OECD Analytical database, OECD STAN database, OECD ANBERD database and Conway *et al*., (2006).

3. The country coverage of the analysis varies depending on the availability of data. Table A2.2 displays the country coverage according to the dependent variables. Industries are identified using International Standard of Industrial Classification (ISIC Rev. 3) at the two digit-level. The industries covered in the analysis of value-added and productivity growth rates are reported in Table A2.3.[1]

4. The data on firm entry and turnover are obtained from two main data sources: *i*) the OECD firm-level database[2] and *ii*) Eurostat Structural Business Statistics database.[3] In addition, data provided by the World Bank and Statistics New Zealand are used. The data from these different sources are merged to obtain a dataset with comparable data on firm entry and turnover for as many OECD countries as possible. The different data sources on firm dynamics include information on the total number of entering and exiting firms. In addition, for most countries data are also available according to the size of firms. The size classification differs in the OECD and Eurostat databases. In order to have a consistent size classification in the merged dataset, firms are classified into two size groups that exist in all data sources: *i*) firms with less than 20 employees, and *ii*) firms with 20 or more employees. The focus of the analysis is on small firms, i.e. on the former group, since the entrants in this size group are likely to represent the "true entrants" and not the outcome of mergers and acquisitions or some other organisational arrangements of firms.[4]

5. The OECD and Eurostat databases differ in the way they define entry and exit. The OECD database defines entry as those firms in year t that did not exist in the database in year t-1 but exist in year t+1. Similarly, exit in year t is defined as those firms that existed in the database in t-1 but disappeared in year t+1. This enables identification of firms that appear in the database for only one year. In the Eurostat database, "one year" firms are not identified separately. To be consistent, these firms are included in both datasets.

6. The variable measuring industries' dependence on external finance is computed from the firm-level information contained in the Thomson Financial Worldscope database. As in Rajan and Zingales (1998), the dependence of a given industry is computed using data on US listed firms. A firm's dependence on external finance is defined as its capital expenditure minus internal funds (cash flow from operations) divided by capital expenditure. Given that large firms tend to have more internal funds available to finance investment, external dependence was calculated excluding such firms (>1000 employees) so as to have more industries with positive dependence ratios. However, the relative ranking of industries according to their dependence on external finance only changes marginally and the overall empirical results are robust to the use of the whole sample of US listed firms.

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1. The industry coverage differs slightly in the analysis of firm demographics where the industry *Electrical and optical equipment* (ISIC 30-33) is analysed at a more disaggregated level. Given the focus on financial development as on of the key determinants, the *Financial intermediation* sector (ISIC 65-67) has been left out form the analysis.

2. The OECD firm-level database is available on line at: http://www.oecd.org/document/4/0,2340,en_2649_37451_1962948_1_1_1_37451,00.html. See Scarpetta, *et al.* (2002) and Bartelsman, Scarpetta and Schivardi (2003) for a detailed description and discussion of the database.

3. See Brandt (2004) for discussion on the Eurostat data and comparison between OECD and Eurostat databases.

4. Firms with zero employees are excluded since the OECD database does not include information on these firms for all countries.

7. In order to obtain the industry-level measure of dependence on external finance, the external dependence of firms is averaged first over time and then aggregated across firms in each industry. Following Rajan and Zingales (1998), the time-averaging is done by summing individual firm's external finance (difference between its capital expenditure and cash flow) over the period of interest and then by dividing the result by the sum of each firm's capital expenditure over the same period. The industry-level measure of external dependence is then defined as the median of this ratio across firms in each industry. Table A2.3 displays the external dependence by industry, and shows that industries related to ICT services and manufacturing as well pharmaceuticals are most heavily dependent on external finance.

Table A2.1 Summary statistics of the dependent variables

	Number of observations	Mean	Median	Standard deviation	Minimum	Maximum
Real value-added growth	466	2.65	2.46	3.35	-13.83	13.35
Labour productivity growth	423	2.37	2.12	3.25	-15.80	13.51
Entry rate	2 170	12.75	11.20	8.09	0.00	60.16
Turnover rate[1]	2 011	23.43	21.55	12.29	0.00	106.16

1. The turnover rate may be larger than 100 if there are several firms that both enter and exit in the same year relative to the total number of firms in a certain industry.

Source: OECD

Table A2.2 Country coverage

Country	Variable		
	Value-added growth	Productivity growth	Firm demographics
Australia	X	X	
Austria	X	X	
Belgium	X	X	X
Canada	X	X	
Czech Republic	X	X	
Denmark	X	X	x
Finland	X	X	x
France	X	X	x
Germany	X	X	x
Greece	X	X	
Hungary	X	X	x
Italy	X	X	x
Japan	X	X	
Korea	X	X	
Mexico	X		x
Netherlands	X	X	x
New Zealand	X	X	x
Norway	X	X	x
Poland	X	X	
Portugal	X	X	x
Slovak Republic	X	X	
Spain	X	X	x
Sweden	X	X	x
Switzerland	X		
United Kingdom	X	X	x
United States	X	X	x

Source: OECD

Table A2.3 Industries' dependence on external finance

Industry	Dependence on external finance
Wood and products of wood and cork (ISIC 20)	-0.45
Fabricated metal products except machinery and equipment (ISIC 28)	-0.25
Construction (ISIC 45)	-0.19
Other non-metallic mineral products (ISIC 26)	0.00
Pulp paper, paper products, printing and publishing (ISIC 21-22)	0.09
Electricity gas and water supply (ISIC 40-41)	0.12
Manufacturing n.e.c.; recycling (ISIC 36-37)	0.17
Machinery and equipment n.e.c. (ISIC 29)	0.19
Textiles, textile products, leather and footwear (ISIC 17-19)	0.19
Other transport equipment(ISIC 35)	0.19
Motor vehicles, trailers and semi-trailers (ISIC 34)	0.20
Transport and storage (ISIC 60-63)	0.43
Basic metals (ISIC 27)	0.44
Food products, beverages and tobacco (ISIC 15-16)	0.53
Rubber and plastics products (ISCI 25)	0.56
Hotels and restaurants (ISIC 55)	0.64
Wholesale and retail trade; repairs (ISIC 50-52)	0.75
Coke refined petroleum products and nuclear fuel (ISIC 23)	0.78
Electrical and optical equipment (ISIC 30-33)	1.62
Post and telecommunications (ISIC 64)	1.67
Real estate renting and business activities including computer and R&D services (ISIC 70-74)	3.35
Chemicals and chemical products (ISCI 24)	6.20

Source: Authors' calculations.

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