Bank development and a lower degree of sophistication and diversification of developing countries' exports

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Abstract

According to mainstream economic theory, development of the banking sector is essential to fund innovation and technological development, especially in developing countries. In turn, this is expected to cause a shift in comparative advantage towards more sophisticated export goods. Moreover, as financial development relaxes firms' liquidity constraints, the expectation is that this would result in a greater capacity to export and hence diversification in the export basket. Alternative economic theories are more critical. On the basis of a different conceptualisation of technological advancement which emphasises the centrality of learning and the tacit character of technology, they conclude that financial liberalisation policies would not make more finance available for innovative activities. To the contrary, the main beneficiaries of such policies would be firms employing simpler technologies and making low value added products. Thus, financial development is more likely to prevent an improvement in the degree of sophistication of a country's export basket. Moreover, as finance is directed towards activities in which the country is already competitive, diversification of the export basket is also hindered. Our empirical analysis provides support for these heterodox theories. Recent empirical work by mainstream researchers also finds that banking sector development forces countries to specialise in accordance with their existing comparative advantage. However, mainstream and heterodox economic theories reach opposite conclusion on whether this is a beneficial process.

Keywords: bank development, export sophistication, export concentration, technological progress, developing countries
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1. Introduction

This paper is in the context of the research on the relationship between finance and economic growth in developing countries. Despite claims by mainstream authors that the evidence of a causal link running from finance to growth is compelling, the matter is in fact far from settled. The global financial crisis is a clear illustration that even developed financial systems can lead to underinvestment and misallocation of resources. Still, the policy advice of international financial institutions to policymakers in developing economies continues to be that liberalisation of the financial sector should be a priority. A private financial system is seen as crucial for promoting economic growth. The role of governments is not in providing financial services – because government officials' lack of expertise coupled with conflicts of interest originating from their political motives would result in inefficient resource allocation – but in regulating and supervising financial systems so as to avoid excessive risk taking and fraudulent behaviour (see, for instance, Demirguc-Kunt and Serven, 2009).

In the economic literature on the finance-growth nexus, researchers have recently pointed to the possibility that the financial system might have beneficial effects on economic growth only up to a point; when it becomes too large, its effects would be negative (see, for example, Cecchetti and Kharroubi, 2012, and Arcand *et al.*, 2012). However, this point of reversal is believed to occur at a relatively high level of financial development such that its existence does not contradict the standard policy advice for developing countries. Be it as it may, this literature mostly looks at aggregate relationships between aspects of the financial system and economic growth; investigations of the precise channels through which the financial system might impact on economic growth are comparatively rare.

One of such channels, which would deserve closer scrutiny since different economic theories yield conflicting predictions, concerns the funding of innovation and technological development. Mainstream theory suggests that developed financial systems mobilise savings,

reduce transaction and monitoring costs, facilitate risk diversification and the acquisition of information about investment projects. In this manner, financial systems not only raise the level of investment but they also improve its composition towards more productive projects. Thus, when developing countries adopt policies which aim to reform and develop their financial systems, the prediction is that the more external finance dependent firms and sectors of activity would be the main beneficiaries of those policies. In what, in our view, is often a leap of faith, it is expected that such sectors and firms are innovative and technologically advanced.

Alternative economic theories give rise to different expectations. For example, in evolutionary theories, the adoption of advanced technology by developing countries does not take place automatically as in those mainstream theories but involves effort and a learning process. The efficient use of foreign technology requires the acquisition of capabilities and competencies that are developed by collective activity through networks of actors. Thus, evolutionary theories have a much more systemic view of how knowledge circulates and diffuses throughout the economy (see, for example, Freeman, 1995). This brings to the fore the active role that the state can play. Heterodox theories also highlight the deep uncertainty underlying technological progress even in countries that are technological followers. For this reason, private banks may be unsuited as a source of funding for activities related to innovation and technological progress and, hence, financial liberalisation policies may not make more finance available for such activities. In fact, it is plausible that liberalisation would mainly benefit the firms that employ simpler technologies and make low value added products. This tendency, which could be a natural characteristic of private banking systems, may be exacerbated in today's financialised environment with its bias towards short termism.

In this paper, we want to subject these alternative views about the role of banking systems for the funding of technological progress to empirical scrutiny. Our working

hypothesis is that liberalisation and expansion of banking systems would lead to a change not only in production patterns but also in export specialisation. If, as mainstream theories suggest, banking sector development favours innovation and technological advancement, comparative advantage would shift towards more sophisticated export goods. Moreover, as financial development relaxes firms' liquidity constraints and enhances their capacity to export, a greater diversification of a country's export basket is also expected to occur. In contrast, if financial liberalisation and banking sector expansion hinder technological progress, as heterodox theories suggest, then the degree of sophistication of a country's export basket might fall. Moreover, as finance is directed towards activities in which the country is already competitive, diversification of the export basket is also hindered. Thus, in this paper, we relate the sophistication and diversification of countries' export baskets to their degree of banking sector development.

The plan of the paper is as follows. Section 2 is a survey of the literature. Three main themes are reviewed: the first is the relationship between financial development and trade specialisation according to the mainstream literature; the second is the conceptualisation of innovation and technological advancement; the third is whether modern, private and liberalised banking systems can be expected to promote sophistication and diversification of a country's export basket. Section 3 introduces our empirical measurements of export sophistication, export diversification and banking sector development. Section 4 analyses the evolution of these measurements over time and their interrelationships in our sample of countries. Section 5 presents our econometric approach and the results of our estimations. Section 6 discusses our findings and concludes.

2. Literature review: finance, innovation and trade specialisation

Baldwin (1989) and Kletzer and Bardhan (1987) are credited for being the first authors to set up theoretical models in which a country's comparative advantage depends on the development of financial institutions. In Baldwin, there are two sectors of activity which differ for their relative vulnerability to demand shocks. In this model, financial development allows countries to better diversify risk. Firms in countries with greater financial development face lower risk premia and specialise in the more risky good. In Kletzer and Bardhan, the two sectors differ for their relative dependence on external finance for working capital. Greater financial development, which is assumed to result in a lower price of external finance and a lower degree of credit rationing, generates comparative advantage in the sector more intensive in the use of financial services. It is worth noting that, in both models, technology (as well as factor endowments) is assumed to be identical across countries.

Beck (2001a) extends the model of Kletzer and Bardhan to allow for different technologies. Focusing on the ability of financial intermediaries to channel savings towards large-scale and high-return projects, the model shows that countries with better-developed financial sectors can exploit economies of scale and have a comparative advantage in manufacturing. The empirical analysis in the paper supports this theory since countries with a higher level of financial development are found to have both higher exports and higher trade balance of manufactured goods.

Beck (2001b) casts the theory in terms of the different industrial sectors. As financial development lowers the cost of external finance, countries with better developed financial sectors should have a comparative advantage – and, hence, higher exports and trade balances – in industries that rely more heavily on external finance. Using the Rajan and Zingales (1998) data on industrial sectors' dependence on external finance, Beck tests and finds support for this theory. In simultaneous research, Svaleryd and Vlachos (2005) obtain the

same findings for the OECD countries. Unlike Beck (2001b), Svaleryd and Vlachos control for a range of factors, namely, the endowments of other production factors – human and physical capital and natural resources – and conclude that differences in financial systems are important determinants of the pattern of specialisation and comparative advantage among OECD economies. These seminal papers have spawn a significant amount of research in the mainstream literature on the relationship between financial development and comparative advantage which has, on the whole, confirmed the finding that financial development increases the exports of sectors that have a greater degree of dependence on external finance and is, therefore, a source of comparative advantage and specialisation in international trade.

This finding is, however, not particularly informative without a more precise characterisation of the sectors that are more external finance dependent. There is a presupposition in Rajan-Zingales (1998) that these sectors may be more innovative and dynamic than those less dependent on external finance. Indeed, Rajan and Zingales argue that financial development allows "new ideas to develop and challenge existing ones" (p. 579). However, other characterisations are also possible. For Kowalski (2011), for example, it is capital-intensive activities which most benefit from financial development and become competitive. Instead, Becker et al (2013) identify activities with high up-front fixed costs (especially, but not solely, exports) as the main beneficiaries from financial development.[1] Also, Manova (2008) finds that countries that are more financially developed acquire comparative advantage in sectors where firms have more limited endowments of tangible assets.

While technologically innovative sectors may share the characteristics identified by this literature, it is the case that these sectors are not singled out explicitly and that, therefore,

[1] Their empirical analysis also suggests that the development of high fixed-costs exports reflects the degree of financial development rather than standard sources of comparative advantage.

the positive effect that financial development might have on the development of such sectors is mostly taken by assumption rather than being the outcome of empirical testing. Potentially, the argument relying on such expected benefits could be further weakened by the empirical shortcomings related to the identification of the respective degrees of external finance dependence of the various industrial sectors as reflected in the ranking created by Rajan and Zingales (1998) and widely utilised in the literature. Von Furstenberg and Von Kalckreauth (2006) show that the use of better quality data – Rajan and Zingales and most of the subsequent papers following a similar methodological approach make use of Campustat data which refer to the median exchange-listed firm in each sector, while Von Furstenberg and Von Kalckreauth use data from the Bureau of Economic Analysis of the US Department of Commerce which are relative to all establishments in each sector – invalidates the ranking of sectoral external finance dependence even for the United States (and therefore its application to all other countries) as well as its underlying assumption that the differences in the degrees of dependence are determined by the structural and technological characteristics of the various industrial sectors. Moreover, Kabango and Paloni (2011) point out that, especially in developing countries, dependence on external finance is influenced by country-specific institutional and political characteristics. For example, some firms/sectors may be regarded as being of strategic importance and, as such, they may enjoy privileged access to finance or, as another example, firms in joint ventures with foreign firms may not be finance constrained. Furthermore, in an environment characterised by political and economic instability, finance would be used for reversible and safer investment and/or working capital rather than long-term capital investment. As a result, firms' external finance dependence would be underestimated if its definition only considers the need to fund capital expenditure, as in Rajan and Zingales. These points suggest that the conclusions reviewed above about the

empirical effect of financial development on industrial specialisation might be resting on shaky grounds.

There might also be a theoretical difficulty with the expectation that developing countries that pursue financial development would specialise in more sophisticated exports. It could be argued that such expectation is based on an abstract and unrealistic conceptualisation of technological advancement in developing countries in mainstream models. These countries are assumed to be technological followers who import innovations from developed countries which they are able to use at best practice without lags, learning or effort. Technology diffuses automatically and without costs across firms and countries. Technological advancement is thus fostered by promoting access to the foreign technology, primarily through trade openness, licensing and above all foreign direct investment. While the need for skills may be acknowledged, these are envisioned as a generic resource which is created by the education system. There is no presumption that the efficient use of technologies may require skills that are specific to those particular technologies and are acquired through prolonged experience with those technologies. In models with learning, this is typically treated as a form of scale economies over time: it is passive, automatic and dependent only on the volume of production. Lall (2000a) emphasises that in these models there is no distinction between *capacity* (which is related to the presence of physical plants and equipment and the availability of blueprints) and *capability* (which is the ability to use them efficiently).

Critics claim that the policy interventions suggested by the mainstream view may in fact impede technological advancement in developing countries. The starting point is to recognise that, in these countries, technological progress depends on innovation – the diffusion and adaptation to developing countries' conditions of goods, machines/technologies, organisational and commercial processes already introduced in

developed countries – rather than invention – for example, though R&D which pushes the knowledge frontier outward (UNCTAD, 2007). This different perspective highlights two crucial aspects of technological progress, namely, the 'tacit' character of much knowledge and technology and the key role of learning. Tacit knowledge and technology cannot be easily documented and codified nor readily transferred (Polanyi, 1966). This implies that the mere access to foreign technology does not immediately entail its effective use, because the assimilation and absorption of foreign technology requires an understanding of the tacit elements of technology. The transfer of technology and production techniques used in advanced countries requires adaptations to the specific economic and institutional context of the adopting country in many broad areas, ranging from product design to production engineering, to industrial planning and organisation. As an example, Evenson and Westphal (1995) list such adaptations as "technological efforts related to raw material control, product and process quality control, production scheduling, repair and maintenance, changes in production mix, as well as others including episodic trouble-shooting to overcome problems encountered in the course of operations" (p. 2249).

Evenson and Westphal also emphasise that the development of technological capabilities – e.g., the capacity to learn about technology, overcome tacit knowledge and achieve mastery – is a gradual process that depends on learning through training and experimentation and, hence, on a stream of investments in learning over time. Thus, in developing countries technological progress does not passively depends on the transfer of technology but occurs mainly through learning – e.g., finding technological alternatives, selecting a technology, learning how to use it efficiently. Technological progress, even in technologically lagging countries, is therefore a process that involves significant costs and uncertainty, where the latter should be understood in the Keynesian sense as 'fundamental, or ontological, uncertainty'. This is a characteristic of non-ergodic economic systems in which

events in the future cannot be given quantifiable probabilities (Davidson, 1989). Lall (2000b) explains that enterprises that make technological investments "may not be able to predict if, when, how and at what costs they would learn enough to become fully competitive, even when the technology is well known and mature elsewhere" (p 17).

The standard mainstream setup based on asymmetric information whereby the entrepreneur has information about their effort level and their project while the financier has at best only partial information is thus inappropriate as a framework for the relationship between innovators and financiers. Nonetheless, this literature identifies some relevant market failures that hinder the financing of investment for technological advancement. Information asymmetries – due to the lack of a track record of managers' entrepreneurial skills and the uncertainties about the profitability of innovative projects – make it extremely hard for outside funders to distinguish between high- and low-value opportunities. This problem cannot easily be resolved, since the innovator would have little incentive to disclose insider information about the project potential due to the risk that other firms may copy the innovator. Given these circumstances, banks may charge excessive risk premia for projects related to technological advancement or may be unwilling to provide finance for such innovative projects altogether since the non-contingent nature of the bank loan contract prevents them from appropriating a share of the productivity gain if the project is successful (Cho, 1986).

Hausmann and Rodrik (2003) focus on a particular type of learning, namely, learning what one is good at producing – which they call 'self discovery' – and point out that, while this knowledge would have great social value, entrepreneurs would be discouraged from incurring the necessary investment costs because other entrepreneurs could quickly emulate such discoveries. Hausmann and Rodrik advocate the introduction of subsidies for initial entrants in new activities and point out that greater financial depth and development of

financial markets would not result in more investment for innovation, as they would not resolve the problem that innovative entrepreneurs cannot internalise the information externality that self discovery generates.

In a context characterised by asymmetric information, competition among lenders, greater financial depth, better transparency and accounting standards are expected to weaken the financial constraint facing entrepreneurs who wish to invest in technology and innovation. However, when the context is better described as being characterised by fundamental uncertainty – as would be the case where technological learning and innovation are involved – these proposed solutions may not be effective. In general it is well known that learning may be associated with market failures. An important instance of this is related to the fact that, since the acquisition of tacit knowledge requires learning-by-doing, production will involve initial periods of loss making that need to be financed. Banks may not be willing to provide this finance or they may provide it only so long as firms invest in known technologies, which are lower risk.

Thus, financial liberalisation and, more in general, the process of financialisation may do little to ameliorate the market failures that prevent funding from being directed towards innovative projects and could indeed make matters worse. It may be worth pointing out that financialisation – which Epstein (2005) defines as "the increasing role of financial motives, financial markets, financial actors and financial institutions in the operation of the domestic and international economies" (p 3) – is not a process that is typical only of advanced economies but also involves developing countries (Lapavitsas, 2009).[2] It is especially acute in middle income countries – as a result of the introduction and expansion of stock markets and increasing openness to international capital markets – but is also noticeable in many low

[2] Palley (2008) argues that neoliberalism is the driving force behind financialisation.

income countries, where for example significant proportions of total banking assets are foreign owned, as in Africa.

Financialisation has led to a radical transformation of the relationships between financial institutions on one side and non-financial corporations and households on the other. This has had adverse consequences for the funding of innovation and production diversification. One reason is the shortening of economic agents' horizon driven by the incessant pursuit of short-term profit. On the one hand, short termism shifts banks' selection of the projects deserving funding towards short-term projects with front-loaded returns, thus hindering entrepreneurial learning. On the other hand, particularly large corporations, which are under pressure to increase shareholder value, adopt shorter planning horizons and take speculative positions in financial assets, thus curtailing their investments in fixed assets and those investments which have longer gestation periods or are more uncertain (Crotty, 2003).

A second channel through which financialisation has resulted in reduced rates of innovation and technological progress has been the shift of bank lending to more profitable and less risky government and household sectors (Lapavitsas and Powell, 2013). This shift has sometimes been instigated by foreign banks: indeed, their entry has been associated with drastic escalation of lending to households for consumption and mortgages. The high profitability of such lending has attracted domestic banks, especially large ones, into this sector. The result has been a drastic contraction in their business lending (dos Santos, 2011).

Responding to this type of market failure requires the management of learning rents (Khan, 2000). In principle, the existence of market failures generates some scope for welfare-improving government interventions and, since the tacit elements of technology vary greatly by technology, it has been argued that attempts to tackle the market failures associated with learning may have to vary by activity (Lall and Teubal, 1998). However, political economy considerations – related to government failures and the rent-seeking behaviour that

government intervention might engender – have led to the mainstream view that the state should refrain from targeting specific market failures. Rather, the role of the state is to create the conditions for the market to operate freely (UNCTAD, 2009, contrasts alternative views on the role of the state in relation to development governance). One consequence of this view, however, is that generalised, non-discriminatory interventions – such as liberalisation of finance and trade and investment in education – would push countries to exploit their existing comparative advantages: the sectors most likely to receive funding and experience growth are those which are already internationally competitive, often low technology, low value added sectors. With low levels of investment in technological change and productivity-enhancing industries, less developed countries would specialise in technologies or products with lower learning potentials. While they may be able to achieve significant manufactured export growth, the sustainability of such growth depends on technological upgrading and deepening, which will not occur without selective policies (Amsden, 2001; Justman and Teubal, 1991). Thus, a heterodox view of technological advancement centred on tacit technology and the crucial role of learning suggests that financial deepening and financial development would result in a reduction in the degree of sophistication of the export basket of developing countries.

It has also been claimed that, for these countries, diversification of their export basket is an essential step to speed up their economic development. Diversification protects countries from the volatility that would be induced by sector-specific shocks and, since exporters are more productive than non-exporters, the increase in the variety of exports – which is typically associated with diversification – would increase country-wide productivity (Melitz, 2003).[3]

[3] Diversification could also result from a more balanced export structure. In this case, the economic literature refers to the 'intensive margin' and contrasts it with the 'extensive margin', which is when diversification occurs through greater varieties of exports

While there is in the literature no theoretical model of reference for the determinants of export diversification, one could draw some inferences about the effect of financial development on diversification from other studies. If, as argued by Manova (2008/2013), financial development relaxes liquidity constraints and leads to an increase in the number of exporters, then financial development may be expected to raise the degree of diversification of a country's export basket. In contrast, it may have the opposite effect if banks provide finance for activities where the economy has already proven to be competitive or if financial liberalisation fails to relax the credit access constraint facing firms and to promote entry (Nissanke, 2001). There are only few empirical studies on the determinants of diversification which have explicitly considered the role of financial development. Their findings reflect the theoretical ambiguity about its expected effects. In Agosin, et al. (2012), the estimated coefficient of financial development is insignificant in all regressions. Bebczuk and Berrettoni (2006) find that financial development either reduces diversification or it has no effect (the latter result is obtained in their preferred specification). In a study on the five members of the Southern African Customs Union, Seabe and Mogotsi (2012) present some weak evidence that financial development helps diversification, as its estimated coefficient is only significant at 10 percent.

3. Empirical measurements of export sophistication, export diversification and banking sector development

The empirical objective of this paper is to present evidence on the effect of financial development on the sophistication and diversification of developing countries' export baskets. We employ two different indicators of export sophistication. The first, proposed by Hausmann, et al (2007), measures the productivity level of a country's export basket. This is obtained in two steps. The first requires the calculation of the productivity level associated

with each export good (that they call $PRODY_k$), which is given by the weighted average of the GDP per-capita of the countries exporting each good. Countries' GDP is weighted by their revealed comparative advantage:

$$PRODY_k = \sum_i RCA_{ik} \times Y_i \quad (1)$$

where Y_i is GDP per capita of country i and RCA_{ik} is the index of revealed comparative advantage in product k by country i.[4] Since goods with high values of *PRODY* are by construction those of which high-income countries are major exporters, the assumption underlying the formulation of *PRODY* is that such high values would denote goods where comparative advantages are determined not by low labour costs but by factors such as intrinsic quality, know-how, technological content, etc. Therefore, these goods would be more sophisticated than goods with low values of *PRODY*. Indeed, *PRODY* has also been called 'index of revealed technology content' of a product.

In the second step, the index of the productivity level of a country's export basket (which Hausmann et al call *EXPY*) is defined as the weighted average of the values of *PRODY* of the goods exported by the country, where the weights are the shares of each good in total exports:

$$EXPY_i = \sum_k \frac{x_{ik}}{X_i} \times PRODY_k \quad (2)$$

We take EXPY as one of our indicators of export sophistication.

Our second indicator is the ratio of technology and skill-intensive manufactured exports (following the classification in Lall, 2000a) to total exports. It is worth noting that our choice of indicators of export sophistication relates our paper to the literature which argues

[4] The index of revealed comparative advantage is $\mathrm{RCA_{ik}} = (\mathrm{x_{ik}}/\mathrm{X_i})/(\mathrm{x_{wk}}/\mathrm{X_w})$, where x_{ik} and X_i represent, respectively, country i's exports of good k and its total exports, x_{wk} is world exports of good k and X_w is total word exports. Hausmann, et al (2007) point out that, since the index relates the share of a given product in a country's export basket to the sum of such shares across all countries exporting the good, their choice of weights for countries' GDP ensures that the ranking of goods according to their productivity level is not distorted by country size.

that exports in sophisticated and high-technology intensive industries have greater linkages with domestic firms and generate larger spillovers (namely, in terms of diffusion of innovation and accumulation of human as well as physical capital) than less sophisticated and lower-technology industries. This pattern of specialisation can give rise to faster and more persistent economic growth (Lall, 2001).

Our measure of the product concentration of exports is the normalised Herfindahl-Hirschmann index. For country *i* it is defined as

$$H_i = \frac{\sqrt{\sum_{k=1}^{n}\left(\frac{x_{ik}}{X_i}\right)^2} - \sqrt{1/n}}{1-\sqrt{1/n}} \quad (3)$$

where X_i is the total value of exports from country *i*, x_{ik} is the value of exports of product *k* from country *i*, and *n* is the number of products exported by country *i*. Its value ranges from 0 to 1. Countries with a preponderance of trade in just a few products would have an index close to 1, though a low value of the index may result if the export values of these products are similar.

3.1 Indicators of banking sector development

We use six indicators of banking sector size and activity: four are standard measures that have been widely used in the mainstream empirical literature; two are aggregate indicators. The first standard indicator is *the ratio of liquid liabilities of the financial system to GDP*. Liquid liabilities equal currency held outside of the banking system plus demand and interest-bearing liabilities of banks and nonbank financial intermediaries. Our second indicator is *the ratio of the total claims of deposit money banks on domestic non-financial sector to GDP*.[5] Both indicators measure the overall size of the formal financial system but have been also

[5] Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.

taken as indicators of the quality of the provision of financial services under the additional assumption that the size of the financial system is correlated with the quality of its services.

Claims on domestic non-financial sector include claims on central, state and local government, non-financial public enterprises and private sector. If the financial system mostly finances the public sector and state-owned enterprises, it has been argued that its size would not be indicative of the quality of the financial services it provides. Under the assumption that the provision of financial services is more likely to be productivity-enhancing when than financial sector interacts with the private rather than the public sector, another indicator which is employed in the literature – the third we use in this paper – is *the ratio of domestic credit by deposit money banks to private firms to GDP*. Higher levels of this ratio are interpreted as a sign of higher levels of financial services and greater banking sector development. This is the most widely used indicator in the finance and growth literature.

Our fourth indicator is *the share of deposit money bank claims in the total claims of domestic money banks and central bank on domestic non-financial sector*. This indicator embodies the assumption that deposit money banks are better able to allocate funds, monitor managers and facilitate risk management than central banks. High values of this indicator therefore should reflect better financial services and greater banking sector development.

The remaining two indicators correspond to different aggregates of the above indicators. Our fifth indicator is *the sum of the standardised values of private credit to GDP and liquid liabilities to GDP*. This indicator has already been used by Demirguc-Kunt and Levine (1996). The sixth indicator is *the sum of the standardised values of all four basic indicators*.

4. Export specialisation and banking sector development: preliminary analysis of data

The country and period samples are described in Section 5; further details are in the Appendix. Tables 1 to 3 below report descriptive statistics for our indicators of export sophistication and concentration.

INSERT TABLES 1 AND 2 APPROXIMATELY HERE

Both *EXPY* and the share of high-technology exports vary greatly across countries. In each time period, the distance between minimum and maximum levels of sophistication is very large and the standard deviation is high. Over time the distribution of both indices has shifted rightwards: the mean, median, first and third quartiles have all increased steadily, though the standard deviation has increased too, suggesting a widening distance among the levels of export sophistication of the countries in the sample.

INSERT TABLE 3 APPROXIMATELY HERE

The degree of product concentration of exports is very different across countries, as shown by large differences between minimum and maximum values and by relatively large standard deviations. Over time, the reduction in export concentration has been larger in the countries whose export basket was already more diversified.

Table 4 reports the evolution of banking sector size and activity as measured by our six indicators. All indicators show large increases in all countries, indicating considerable banking sector development. The standard deviation also becomes larger, except for the share of domestic money bank claims, which is bounded at 100 percent.

INSERT TABLE 4 APPROXIMATELY HERE

The initial description of our data shows that the developing countries in our sample have on the whole improved the sophistication of their exports and reduced the concentration of their export baskets while achieving a large expansion in their banking sectors. However, there is pronounced heterogeneity in the degree with which different countries have been able

to record these positive results. We want to investigate whether the improvement in the sophistication and diversification of export baskets can be related to countries' banking sector development.

INSERT FIGURES 1 AND 2 APPROXIMATELY HERE

Figures 1 to 3 show the level of banking sector development, as measured by our six indicators, for the countries in our sample divided into groups according to the degree of improvement in the sophistication and diversification of their export baskets. The figures show that there is no positive relationship between banking sector development and the speed of improvements in export sophistication and diversification. In Figure 1, countries with the fastest improvement in sophistication (as measured by *EXPY*) often have the lowest level of banking sector development. This evidence appears even stronger in Figure 2, where sophistication is measured by the share of high-tech exports. In this case, it is also countries in the upper-middle category of improvement in export sophistication which have a level of banking sector development that is lower than in countries that have improved their sophistication more slowly. Table 5 shows the existence of negative correlation between the improvement in export sophistication and banking sector development. Such correlation is statistically significant for most indicators and is found regardless of whether banking sector development is measured as an average over the entire sample period, at the beginning of the sample period or at the end.[6]

INSERT TABLE 5 APPROXIMATELY HERE

In Figure 3, the groups of countries labelled 'low' and 'low-mid' are those that recorded an overall decrease in the index of product concentration over the period; in the 'upper-mid' group, the index fell marginally in three countries and rose in all others; the

[6] To reduce the influence of business cycle effects, the measures of banking sector development both at the beginning and at the end of the sample period have been calculated as an average over a four-year period.

index rose at a faster rate in the 'high increase' group of countries. The figure shows that the countries with the highest level of bank development had the highest increase in product concentration. In general, the countries which improved diversification of their exports have a level of bank development lower than in other countries. Table 5 reports positive correlations between the increase in concentration of export baskets and the level of banking sector development at the beginning, at the end or over the entire sample period.

INSERT FIGURE 3 APPROXIMATELY HERE

5. Econometric analysis

The empirical results presented so far are suggestive that banking sector development may have a negative influence for the capacity of developing countries to improve the sophistication and diversification of their export baskets. However, it is possible that such negative association may be due to the influence of factors which have not been taken into consideration. To address this problem and account for the impact of such factors we have performed an econometric investigation.

Panel data analysis allows one to exploit the information present in time-series variation of the data and to control for biases due to unobserved country-specific effects. Our estimated model is:

$$DEPVAR_{it} = a_1 BANK_{it} + \sum_m b_m CV_{it} + D_i + D_t + u_{it} \quad (4)$$

where *DEPVAR* is the sophistication of exports in some regressions and the product concentration of exports in others; subscripts *i* and *t* denote country and time; *BANK* is an indicator of banking sector development; *CV* is a set of *m* control variables, among which we include the lagged dependent variable in both the sophistication and concentration regressions to reflect the fact that the productive structures of a country are affected by its own history and hence export structures should be expected to be path-dependent and

difficult to change. The lagged dependent variable may also represent factors that, although not modelled explicitly, may have influenced export specialisation in the previous period. D_i and D_t are country- and time-specific effects, accounting respectively for heterogeneous country-specific characteristics and for shocks affecting all countries simultaneously. The error term is denoted by u. The country sample only includes developing countries (with the exclusion of countries of the former USSR and small island states). The sample period is 1985-2000 for *EXPY* regressions and 1995-2010 for the share of high-technology exports and export concentration regressions. The size of country and period samples is only determined by the availability of data.

An econometric approach which has been proposed to estimate models such as (4), which account for inertia in the dependent variable, endogeneity of the explanatory variables and unobserved country-specific characteristics within a panel data framework characterised by a small number of time periods and a large number of cross-sectional units, is the system Generalised Method of Moments (Blundell and Bond, 1998). In fact, given a time dimension such as that of our sample, the system-GMM estimator has been found to outperform all others (Judson and Owen, 1999).

The system is formed by a level equation – equation (4) above – and a difference equation, which is obtained by first-differencing (4). The instruments used in the estimation are internal: in the level equation, the instruments are lagged first-differences of the series while they are levels of the series lagged two periods or more in the difference equation. Consistency of the GMM estimator requires the instruments to be exogenous. Following standard practice, we have checked for this by means of two tests: one is the heteroscedasticity-consistent Hansen-J test; the other is the test for the absence of second-

order serial correlation of the errors in the difference equation.[7] The former tests the exogeneity of the instruments as a group while the latter detects whether some lags of the dependent variable, which might be used as instruments, are in fact endogenous and, hence, bad instruments. Since a high number of instruments can give rise to an over-fitting bias and also lower the power of the Hansen test, we reduced their number through the 'Collapse' command in Stata, which makes them a linear – instead of quadratic – function of the number of observations. The results of our system GMM estimations are based on robust standard errors and the two-step estimator with the Windmeijer small-sample correction.[8]

5.1 Control variables

Developing countries' export specialisation is typically explained on the basis of comparative advantage. In the Ricardian version, comparative advantage is driven by differences in producers' relative productivities. In the Heckscher-Ohlin version, comparative advantage results from countries' relative endowments of factors of production, which determine input costs and hence profitability. Thus, endowments of productive factors and technology are expected to determine a country's sophistication of its export basket as well as its diversification.

5.1.1 Sophistication of the export basket

Some factors of production are given by nature. We have employed the *land to labour ratio* to control for the endowment of natural resources. When they are abundant, a country's competitive advantage would lie in primary exports and hence the land to labour ratio is expected to be negatively related to export sophistication.

[7] By construction, first-order serial correlation is expected in the differenced error term even if the error term in levels is not autocorrelated.
[8] Windmeijer's small-sample correction makes the two-step estimator more efficient than the one-step estimator even in a small sample.

Other production factors, such as human capital, are the result of policies. Investment in human capital enhances a country's learning and innovative capacity and, therefore, the availability of human capital – which we measure by the *average years of schooling* in the population over 15 years – is expected to be positively related to export sophistication.

We control for a country's income level – measured by (the log of) *real GDP per capita* – as this is likely to be correlated with the degree of sophistication of exports. For example, the fact that rich countries' international competitiveness of their products is not undermined by high wages reflects characteristics that are to an important extent related to their embodiment of more advanced technology and their sophistication. Indeed, this is also the rationale underlying the construction of *EXPY*. Our econometric approach also allows for the sophistication of the products in which a country specialises to have an impact on subsequent economic performance.

Participation in international trade may provide opportunities for learning and adoption of more advanced technology. Exposure to a variety of customers and competitors may enhance incentives for exporters to adopt best-practice technology and business processes. Exporting may thus have positive effects on firms' knowledge and technology accumulation. Learning can also take place through importing, as imported products may embody higher quality. To control for the effect that trade may have on the sophistication of a country's exports we use the *total trade (exports plus imports) to GDP ratio*.

Subject to host countries' appropriate absorption capacity, foreign direct investment is a major channel for technological diffusion. Foreign firms are endowed with more advanced technology and hence domestic firms in a joint venture with foreign firms would export more sophisticated products. Foreign knowledge and technology can spill over to other domestic firms through imitation and through the labour turnover process, whereby employees who gained new knowledge in foreign owned firms become employed in domestic firms. To

account for the impact of foreign direct investment on export sophistication we use the *ratio of foreign direct investment to GDP*.

5.1.2 Concentration of the export basket

The endowment of natural resources, proxied by the *land to labour ratio*, is expected to be positively related to export concentration. As the real exchange rate appreciates, the manufacturing sector in particular and all tradeables in general lose competitiveness – this is the so-called 'Dutch disease' phenomenon. The shift of resources away from manufacturing may even give rise to a process of deindustrialisation which over time would reinforce the country's dependence on the revenue from primary exports. Product concentration in resource-rich countries is expected to be relatively higher than in more manufacturing-oriented countries, since skills and assets used in the production of primary goods can generally be deployed in the production of a limited range of products while those involved in manufacturing can be used in the production of a large range of manufactures – this is the 'monkey-tree' argument in Hidalgo et al (2007).

The range of goods in which a country has comparative advantage, as reflected in the export concentration index, can be expected to be associated with its level of income (proxied by *real GDP per capita*). A country would tend to be internationally competitive in a narrow range of goods at a low level of income and in a wider range at a higher income.[9]

The level of participation in international trade (which we measure by the *total trade to GDP ratio*) may impact on export diversification. Trade liberalisation enhances export opportunities in certain industries and sectors and may thus raise the number of exporting

[9] Some research finds that at still higher levels of income, re-specialisation may occur (Imbs and Wacziarg, 2000). However, the turning point at which re-concentration is found to occur is at quite a high level of income per capita. Moreover, other empirical work suggests that diversification continues even at high levels of income and there is no re-specialisation (see the review in Kaulich, 2012). In our regressions, we find no evidence of re-specialisation.

firms and reduce concentration (Bernard, et al., 2005). Learning from imports and exports and the opportunities for knowledge and technology diffusion that trade makes possible may also be reflected in greater export diversification. Exporting firms could also benefit from greater availability and variety of imported inputs.

Openness to foreign direct investment (measured by the *foreign direct investment to GDP ratio*) may contribute to the diffusion of foreign knowledge and technology. Thus, foreign direct investment may be expected to contribute to raising the degree of diversification of the host country's export basket.

Concentration may also be affected by the evolution of a country's terms of trade. For example, if the price of a commodity which is a country's main export increases, productive and financial resources would tend to be reallocated towards that sector to the detriment of other sectors with the result of greater product concentration in the export basket.

5.2 Econometric results

These are reported in Table 6-8. The export sophistication regressions with *EXPY* as the dependent variable are rather successful as almost all the estimated coefficients are highly significant and no misspecification can be detected (see Table 6). Export sophistication is shown to be highly path dependent. Trade, human capital, foreign direct investment and per capita income are positively related to greater sophistication while the relative endowment of natural resources has a negative relationship. Our variables of interest are those representing banking sector development. They all show a negative relationship with export sophistication which, with the exception of liquid liabilities, is always statistically significant.

INSERT TABLE 6 APPROXIMATELY HERE

These findings are consistent with those from the sophistication regressions with the share of hi-tech exports as the dependent variable (Table 7). The relationships between

control variables and sophistication are all confirmed, though they sometimes turn out not to be statistically significant. In these regressions too, banking sector development is inversely related to export sophistication and this relationship is significant most of the time.

INSERT TABLE 7 APPROXIMATELY HERE

The results from the export concentration regressions are reported in Table 8. Almost all the estimated coefficients are statistically significant and there is no trace of misspecification. Export concentration is characterised by considerable inertia. Higher levels of international trade, foreign direct investment inflows and income per capita would tend to reduce concentration; higher natural resource endowments and more favourable terms of trade would tend to raise it. As to banking sector development, the evidence is that it would tend to increase export concentration, though this relationship is often not significant at conventional levels.

INSERT TABLE 8 APPROXIMATELY HERE

6. Discussion and conclusions

The empirical results presented in this paper indicate that banking sector development may result in a pattern of export specialisation characterised by lower technological sophistication and lower product diversification of a country's exports. These findings are consistent with theories predicting that banking sector development would tend to enforce a pattern of export specialisation conforming with a country's existing comparative advantages. As mentioned in the literature review section, an explicit empirical analysis of the relationship between banking sector development and export specialisation along the lines followed by this paper has not attracted the attention that in our opinion it deserves and, thus, a direct comparison of the published literature with our findings is not possible.

However, we would like to refer the reader to the work by Jaud et al. (2010). Although their research has a completely different approach from ours – they analyse whether the survival of a country's exports in foreign markets can be related to that country's degree of banking sector development – their findings are remarkably similar. They find that banking sector development promotes exports but does so in a discriminatory manner, that is, it "helps to push the country's exports towards products congruent with its comparative advantage [as determined by factor endowments]" (p. 3), thus forcing exporters to abandon products that are less congruent.

It is perhaps worth pointing out that the implications that they draw from these findings are significantly different from ours. For them, the fact that banking sector development forces export patterns to conform to a country's comparative advantage is a major benefit of banking sector development because, in their view, resources are used optimally only when they are employed in accordance with a country's factor endowments. It is only then that a country's exports can be sustainable in the long run. Therefore, one of their recommendations is that governments that are eager to promote exports should aim to develop their country's banking sector first. In contrast, we are more persuaded by the argument – as well as the supporting evidence – that the type of products a country produces and specialises in determines its subsequent economic performance. This implies that countries should defy their comparative advantages, instead of conforming to them (see the debate on this matter in Lin and Chang, 2009). Hence, from this particular perspective, financial development should not be a policy priority. Nonetheless, it should be emphasised that it was not one of the objectives of this paper to assess the overall merits of financial development. Far less ambitiously, our paper investigated whether financial development could play a role in increasing the sophistication and diversification of a country's export basket and concluded with a negative answer.

What are the boundaries within which this result might be sensible? Can financial development always have negative effects on export sophistication and diversification? Or would a relationship described by an inverted-*U* – whereby the negative effect of financial development occurs only after a certain threshold – be more reasonable? Indeed, one might contend that some degree of financial development should be expected to have positive effects; after all, Schumpeter emphasised the importance of the credit system for the funding of entrepreneurial activity, which has innovation as a defining feature. Mazzucato (2013) notes, however, that Schumpeter simply assumed that finance would nurture innovation; the possibility that it might hurt it was not considered. This is attributed to two factors: one is that the process of financialisation was not a characteristic of Schumpeter's time; the other is Schumpeter's 'semi-romantic' view of the banker as the 'ephor' of capitalism. Mazzucato maintains that financialisation has transformed the role of finance from one of facilitating the process of value creation in the economy to one of extracting value from it. As financialised firms make their profits no longer mainly from technological innovation but from financial speculation and manipulation activities, banks have become unable to distinguish between the 'good' risk (which originates from investment in innovation) and the 'bad' risk (which arises from weak economic performance or from speculative activities and higher debt) and, thus, the credit system has come to penalise innovation. The fact that we find no evidence in our empirical work of an inverted-*U* shaped relationship could be consistent with an explanation based on the transformation of the financial system brought about by financialisation.

Our final observation is about the limitations of our study. The empirical analysis it contains is cross-country and, thus, it does not fully account for country-specific characteristics, such as their particular history, institutions, social and political-economy features which are crucial in determining policy outcomes. Our study uncovered a certain relationship between banking sector development and export specialisation, which we think is

interesting as a direction for future research. However, in our view, a deeper understanding of how such relationship works out in practice requires country studies which explicitly consider those country-specific characteristics. For the same reason, we think that it is not through cross-country studies that one can derive real policy implications to ensure that the financial system would support a desirable pattern of export specialisation. Again, a country-study approach would be of great value in this context. The research agenda is long.

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Appendix – Sources of data and country samples

Dependent variables

(1) EXPY index

Source: Dani Rodrik's webpage at:

http://drodrik.scholar.harvard.edu/research-papers, under Rodrik, D., Hausmann, R, Hwang, J., What You Export Matters, 2006

(2) Share of high technology exports: (2.1.) High technology exports (Lall classification)

Source: UNCTAD Statistics at http://unctadstat.unctad.org

(2.2) Total exports

Source: World Bank's World Development Indicators at

http://data.worldbank.org/data-catalog/world-development-indicators

(3) Export concentration index

Source: UNCTAD Statistics

Bank development variables

(1) Ratio of liquid liabilities to GDP;

(2) Ratio of total claims of deposit money banks on domestic non-financial sector to GDP;

(3) Ratio of domestic credit by deposit money banks to private firms to GDP;

(4) Share of deposit money bank claims in total claims of domestic money banks and central bank on domestic non-financial sector

Source (1)-(4): World Bank's Global Financial Development database at

http://data.worldbank.org/data-catalog/global-financial-development

(5) Sum of standardised values of (1) and (3);

(6) Sum of standardised values of (1) to (4)

Source (5)-(6): Authors' calculations

Control variables

(1) Land to labour ratio (total land area to the size of the labour force);

(2) Real GDP per capita;

(3) Total trade to GDP;

(4) Terms of trade;

(5) Foreign direct investment to GDP

Source (1)-(5): World Bank's World Development Indicators

(6) Human capital (average years of schooling in the population over 15 years)

Source: Barro-Lee database at http://www.barrolee.com.

As the data are at 5-year intervals, the values for the years with missing observations have been estimated by linear interpolation

Source: Authors' calculations

Country samples

Algeria[1], Argentina, Bangladesh, Benin, Bolivia, Botswana[1], Brazil, Burkina Faso, Burundi, Cameroon, Central Africa Republic[1], Chad, Chile, China, Colombia, Congo Democratic Republic, Costa Rica, Cote d'Ivoire, Dominican Republic, Ecuador, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guatemala, Honduras, Hong Kong[2], India, Indonesia, Iran, Jamaica, Jordan, Kenya, South Korea, Madagascar, Malawi, Malaysia, Mali, Mauritania[1], Mauritius, Mexico[2], Morocco, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Senegal, Singapore, South Africa, Sri Lanka, Syria, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Uganda, Uruguay, Venezuela, Zambia, Zimbabwe[1]

[1] Not included in export sophistication regressions

[2] Not included in regressions where the share of banks' claims or the overall index of bank development are among the explanatory variables

Table 1. *EXPY index, descriptive statistics*

	1985	1990	1995	2000
Minimum	2128.14	1782.90	2095.96	1960.96
1st quartile	3483.92	4027.40	4240.78	5099.87
Median	5047.77	5277.91	5767.42	6269.16
Mean	5523.74	5677.13	6170.62	7040.14
3rd quartile	6569.83	7087.11	7794.71	8966.26
Maximum	12082.10	11445.10	12921.40	14183.30
Standard deviation	2432.69	2228.63	2737.76	3052.08

Table 2. *Share of high-tech exports, descriptive statistics*

	1995	2000	2005	2010
Minimum	0.102	0.014	0.046	0.154
1st quartile	0.667	0.832	1.123	2.406
Median	1.727	2.552	3.549	5.447
Mean	4.001	3.859	5.429	7.388
3rd quartile	6.032	6.118	8.128	11.300
Maximum	19.512	17.057	26.721	38.271
Standard deviation	4.717	3.858	5.618	6.845

Notes: Values in percentages

Table 3. *Index of export concentration, descriptive statistics*

	1995	2000	2005	2010
Minimum	7.00	7.72	8.63	8.57
1st quartile	21.58	21.27	18.67	16.99
Median	30.84	29.83	28.41	26.90
Mean	35.62	35.81	35.03	33.26
3rd quartile	49.61	49.85	45.98	44.43
Maximum	85.00	92.76	91.71	85.41
Standard deviation	20.17	20.13	21.00	19.26

Notes: Values in percentages

Table 4. *Indicators of banking sector development, descriptive statistics*

	Liquid liabilities				Total claims on real sector				Private sector credit			
	1985	1990	2000	2010	1985	1990	2000	2010	1985	1990	2000	2010
Minimum	4.46	5.52	8.34	13.00	2.91	3.26	5.23	6.45	1.70	2.39	3.33	4.59
1st Quartile	20.05	19.38	21.86	29.35	19.23	16.10	19.24	23.36	13.72	12.8	14.45	17.17
Median	27.96	29.19	37.57	41.39	28.02	23.58	32.38	34.26	20.86	19.92	23.76	23.85
Mean	34.99	34.96	42.57	52.24	32.21	30.52	40.55	45.60	25.29	24.48	32.19	34.85
3rd Quartile	43.02	40.22	52.34	70.49	36.59	39.15	57.39	62.03	29.55	29.73	35.05	45.20
Maximum	110.28	122.14	116.72	129.13	119.64	102.95	131.60	121.44	92.24	78.03	122.80	105.06
Standard deviation	23.27	24.61	27.63	30.54	22.32	21.27	30.51	30.60	18.58	18.07	28.36	26.28
	Share of banks' claims				Credit and liabilities				Overall bank development			
	1985	1990	2000	2010	1985	1990	2000	2010	1985	1990	2000	2010
Minimum	15.57	22.55	14.46	49.52	-2.34	-2.20	-2.20	-2.02	-7.02	-5.67	-5.47	-4.42
1st Quartile	56.57	60.98	70.45	82.32	-1.39	-1.45	-1.24	-0.70	-2.34	-2.49	-1.99	-0.90
Median	71.28	72.20	82.88	89.38	-0.66	-0.74	-0.40	-0.14	-1.24	-1.30	-0.07	0.60
Mean	69.88	71.22	77.89	87.28	-0.42	-0.45	0.20	0.65	-1.14	-1.03	0.42	1.51
3rd Quartile	88.35	89.53	92.01	95.54	0.14	-0.12	0.61	1.48	-0.46	-0.16	1.50	2.93
Maximum	99.35	100.00	99.94	100.00	4.91	4.43	6.79	6.55	9.15	7.49	11.22	10.90
Standard deviation	20.57	19.41	19.03	11.77	1.39	1.46	2.13	2.08	2.80	2.76	3.77	3.51

Notes: Values for Liquid liabilities, Total claims on real sector, Private sector credit, and Share of banks' claims are in percentages. Values for Credit and liabilities, and Overall bank development are standardised.

Table 5. *Correlations between rates of growth in export sophistication and concentration and indicators of banking sector development*

	Banking sector development, period average					
	Liquid liabilities	Claims on real sector	Private sector credit	Share of banks' claims	Credit and liabilities	Overall bank development
Sophistication Growth (*EXPY*)	-.295 [.102]	-.372** [.036]	-.406** [.021]	-.301* [.094]	-.347* [.052]	-.367** [.039]
Sophistication growth (high-tech exports share)	-.237* [.054]	-.281** [.021]	-.221* [.072]	-.303** [.013]	-.229* [.062]	-.243** [.050]
Concentration growth	.163 [.183]	.212* [.083]	.233* [.055]	.280** [.022]	.203* [.097]	.152 [.220]

	Banking sector development, initial four-year average					
Sophistication Growth (*EXPY*)	-.236 [.209]	-.375** [.041]	-.388** [.034]	-.118 [.528]	-.317* [.088]	-.260 [.173]
Sophistication growth (high-tech exports share)	-.207* [.094]	-.210* [.089]	-.203* [.099]	-.297** [.017]	-.206* [.095]	-.208* [.099]
Concentration growth	.168 [.171]	.225* [.065]	.258** [.033]	.284** [.022]	.225* [.065]	.178 [.157]

	Banking sector development, final four-year average					
Sophistication Growth (*EXPY*)	-.413** [.019]	-.435** [.013]	-.443** [.011]	-.480*** [.006]	-.440** [.012]	-.415** [.020]
Sophistication growth (high-tech exports share)	-.236* [.057]	-.334*** [.006]	-.252** [.041]	-.221* [.077]	-.254** [.039]	-.249** [.047]
Concentration growth	.190 [.124]	.190 [.124]	.216* [.080]	.237* [.055]	.208* [.091]	.126 [.317]

Notes: ***, **, * denote significance at 1, 5 and 10 percent respectively. Probability values are reported in square brackets below the respective correlation coefficients. In the case of *EXPY*, the reported correlations only include the countries with the greater increase in sophistication (at least as the median).

Table 6. *Regression results: Export sophistication (log of EXPY), 1985-2000*

	Banking sector development					
	Liquid liabilities	Total claims on real sector	Private sector credit	Share of banks' claims	Credit and liabilities	Overall bank development
	-.054 (.037)	-.073* (.044)	-.110* (.062)	-.458** (.214)	-.011* (.006)	-.112*** (.043)
Lagged sophistication	.763*** (.075)	.737*** (.091)	.732*** (.091)	.768*** (.114)	.741*** (.084)	.777*** (.096)
Trade	.177** (.076)	.198** (.079)	.214** (.084)	.225* (.127)	.200*** (.078)	.280** (.139)
Income per capita	3.96E-4* (2.28E-4)	4.83E-4** (2.31E-4)	4.15E-4* (2.45E-4)	9.39E-4** (4.80E-4)	4.35E-4* (2.43E-4)	8.91E-4** (4.09E-4)
Human capital	.204* (.121)	.202** (.097)	.220** (.112)	.214 (.153)	.199* (.106)	.221 (.155)
Endowments	-.058*** (.019)	-.066*** (.023)	-.074*** (.025)	-.092** (.042)	-.064*** (.023)	-.118** (.047)
Foreign direct investment	.018*** (.007)	.019*** (.007)	.020*** (.007)	.025** (.012)	.019*** (.007)	.027** (.013)
Wald test	3837.33 [.000]	4973.91 [.000]	3881.01 [.000]	1332.11 [.000]	4641.64 [.000]	947.47 [.000]
Hansen *J*-test	3.35 [.501]	2.63 [.621]	2.81 [.590]	3.85 [.427]	3.15 [.534]	3.54 [.472]
AR (1) errors	-3.27 [.001]	-3.29 [.001]	-3.24 [.001]	-3.16 [.002]	-3.26 [.001]	-3.16 [.002]
AR (2) errors	-.26 [.791]	-0.24 [.812]	-.26 [.797]	-.17 [.865]	-.26 [.793]	.12 [.902]
No. of observations	862	866	865	847	862	828

Notes: ***, **, * denote significance at 1, 5 and 10 percent respectively. Robust standard errors are reported in round brackets below the respective estimated coefficients. Probability values are reported in square brackets below the respective values of the test statistics.

Table 7. *Regression results: Export sophistication (high-tech exports share), 1995-2010*

	Banking sector development					
	Liquid liabilities	Total claims on real sector	Private sector credit	Share of banks' claims	Credit and liabilities	Overall bank development
	-.011**	-.013	-.014	-.046*	-.002**	-.007*
	(.005)	(.008)	(.009)	(.026)	(.001)	(.004)
Lagged sophistication	.790***	.801***	.791***	.781***	.770***	.759***
	(.078)	(.084)	(.089)	(.065)	(.079)	(.062)
Trade	.016*	.016	.017	.022	.019**	.024*
	(.009)	(.010)	(.010)	(.016)	(.009)	(.015)
Income per capita	4.76E-5*	3.47E-5	3.74E-5	7.81E-5**	4.43E-5*	1.33E-4***
	(2.70E-5)	(2.57E-5)	(2.52E-5)	(3.28E-5)	(2.52E-5)	(4.08E-5)
Human capital	.028*	.026	.026	.027	.032*	.033*
	(.016)	(.019)	(.019)	(.022)	(.018)	(.018)
Endowments	-.003	-.003	-.003	-.008**	-.003	-.003**
	(.002)	(.002)	(.002)	(.004)	(.002)	(.001)
Foreign direct investment	.001	.001	.001	.002	.001	.003*
	(.001)	(.001)	(.001)	(.001)	(.001)	(.002)
Wald test	1726.48	2148.48	1753.70	1651.80	1798.20	2141.57
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
Hansen *J*-test	13.70	13.46	12.90	3.51	12.78	1.61
	[.187]	[.199]	[.230]	[.476]	[.236]	[.806]
AR (1) errors	-2.92	-2.93	-2.90	-2.90	-2.87	-2.90
	[.003]	[.003]	[.004]	[.004]	[.004]	[.004]
AR (2) errors	-.16	-0.12	-.10	-.18	-.10	-.24
	[.875]	[.902]	[.917]	[.858]	[.920]	[.808]
No. of observations	851	855	854	835	851	816

Notes: ***, **, * denote significance at 1, 5 and 10 percent respectively. Robust standard errors are reported in round brackets below the respective estimated coefficients. Probability values are reported in square brackets below the respective values of the test statistics.

Table 8. *Regression results: Export concentration, 1995-2010*

	Banking sector development					
	Liquid liabilities	Total claims on real sector	Private sector credit	Share of banks' claims	Credit and liabilities	Overall bank development
	.002**	.002	.006**	.068	.005	.003
	(.001)	(.003)	(.003)	(.072)	(.004)	(.002)
Lagged concentration	.728***	.699***	.757***	.772***	.729***	.723***
	(.054)	(.081)	(.060)	(.082)	(.080)	(.079)
Trade	-.050***	-.057***	-.046***	-.055**	-.056**	-.056***
	(.018)	(.020)	(.017)	(.023)	(.023)	(.020)
Income per capita	-.011**	-.013**	-.010**	-.015*	-.010*	-.012*
	(.005)	(.006)	(.005)	(.008)	(.006)	(.006)
Endowments	.005*	.005*	.005*	.006*	.005*	.006
	(.003)	(.003)	(.003)	(.004)	(.003)	(.004)
Terms of trade growth	.062***	.071***	.057***	.060***	.067***	.065***
	(.018)	(.020)	(.017)	(.022)	(.003)	(.020)
Foreign direct investment	-.015***	-.017**	-.013***	-.015**	-.012**	-.015**
	(.006)	(.007)	(.005)	(.006)	(.006)	(.006)
Wald test	2672.57	2485.98	3642.18	3403.97	2449.27	1870.17
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
Hansen *J*-test	.55	1.23	.95	2.12	1.73	.81
	[.759]	[.539]	[.380]	[.347]	[.422]	[.669]
AR (1) errors	-4.06	-3.91	-4.01	-4.29	-4.10	-4.06
	[.000]	[.000]	[.000]	[.000]	[.000]	[.000]
AR (2) errors	1.22	1.24	1.24	.92	1.24	.081
	[.224]	[.217]	[.215]	[.357]	[.217]	[.669]
No. of observations	946	947	949	931	946	905

Notes: ***, **, * denote significance at 1, 5 and 10 percent respectively. Robust standard errors are reported in round brackets below the respective estimated coefficients. Probability values are reported in square brackets below the respective values of the test statistics.

Figure 1. *Banking sector development in countries increasing export sophistication (EXPY) more or less quickly, 1985-2000*

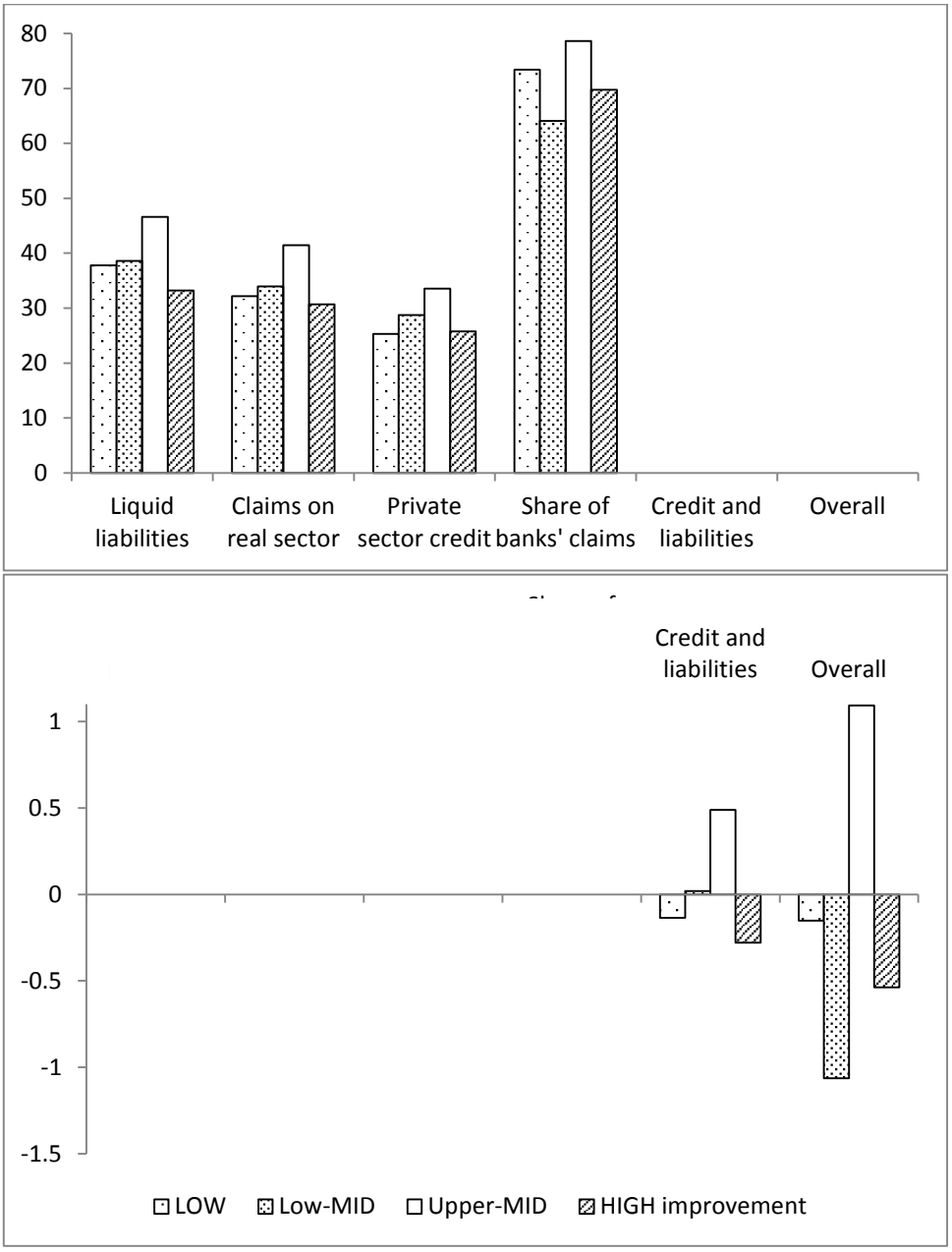

Figure 2. *Banking sector development in countries increasing export sophistication (High-tech exports share) more or less quickly, 1995-2010*

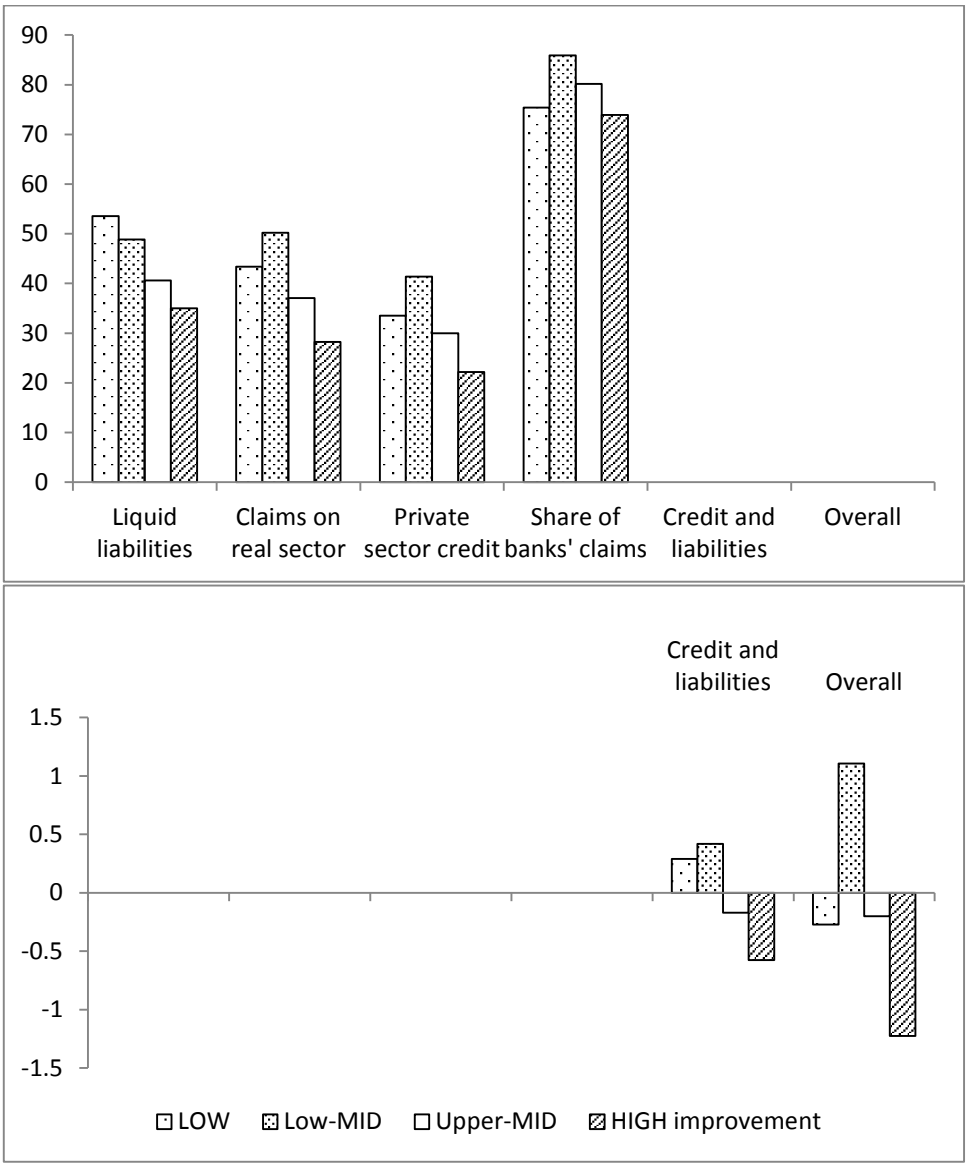

Figure 3. *Banking sector development in countries increasing (or decreasing) export concentration more or less quickly, 1995-2010*