

Financial development and export diversification in resource-rich developing countries

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Abstract: The paper investigates the impact of financial development on export diversification in resource-rich developing countries. This research question is motivated by the role of financial development in industrial upgrading and diversification. We study a sample of 38 resource rich developing countries for the period 1995-2013 and employ two methods: panel Fixed Effect and panel cointegration estimations (using the Dynamic Ordinary Least Square (DOLS) estimator). In the first method, we find that financial development has no significant impact on export concentration. While in the second method, the results suggest that financial development has a significant positive impact on export concentration. The later finding can be explained by arguing that developing the financial sector (measured by the banking system depth) is more likely to help the country to specialize according to its comparative advantage rather than defying it because of its risk averse nature. Hence, financial development in resource-rich developing countries might not be a key to upgrade and diversify the export structure. Thus, governments are encouraged to provide alternative sources of finance that are capable of fulfilling this gap. These sources can take the form of development banks, industrial banks, and publicly funded venture funds.

1 Introduction

The reliance of many resource-rich countries on producing and exporting primary products is considered a crucial drawback to their development and growth. Some economists explain it as the existence of a “resource curse” in resource-rich countries, that is, an association between a large share of natural-resources and slow GDP growth (Sachs and Warner, 2001). Others have challenged this view by finding evidence that export concentration is what reduces growth, and there is no negative impact of natural resource abundance on growth (Ledermand and Maloney, 2007). In other words, they argue that the “resource curse” is basically a result of export concentration. One explanation for the lack of export diversification in these countries is the presence of incomplete financial markets (Acemoglu and Zibloti, 1997; DeRosa, 1992). However, others have shown that financial development may push countries to concentrate according to their comparative advantage (Saint-Paul, 1992; Jaud et al., 2012). In this study, the main objective is to investigate the effect of the financial sector’s development on export diversification in resource-rich developing countries using two methods: panel fixed effect estimation and panel cointegration approach.

2 Study motivation

Several developing countries are undertaking structural reforms towards upgrading and diversifying their export structure. However, there is a lack of understanding with regard to the determinants of export diversification (Agosin et al., 2012). One potential determinant that needs to be explored is financial development. The importance of studying this factor comes from the fact that international institutions (like the IMF, World Bank, and United Nations) continue to persuade developing countries to implement policies towards more

liberalised and open financial markets. For example, the UN Economic Commission for Africa (2006) argues that the lack of development in the financial markets is a key reason for the limited economic diversification in resource-rich African countries. However, even after the adoption of such policies by some developing countries, their industrial and economic diversification performance has remained poor (Lall, 1996).

The study investigates whether resource-rich countries are likely to have a more diversified export structure following financial development. The study will contribute to the literature in four ways: First, it will contribute to the scarce amount of empirical literature on the determinants of export diversification in developing countries; if it is established that financial development induces export diversification, this will emphasise the role of financial development in shaping and upgrading their export structure. Second, this study contributes to the literature by implementing recently developed panel cointegration estimations. To the best of our knowledge, there is no existing empirical research investigates export diversification determinates using panel cointegration approach. Third, it will contribute to the controversial literature on the role of finance in resource-rich economies. It is argued that the role of financial development in resource-rich countries is not only weak, but also has a contractionary effect on private investment (Nili and Rastad, 2007). Beck (2011) on the other hand, shows that finance has an impact on growth in oil-rich countries, but it is weak. He argues that the reason is due to a natural resource curse from financial development. Finally, although there is some existing literature on the relationship between finance and growth in resource-rich countries, there does not appear to be any study on the relationship between finance and trade in these countries.

3 Literature review

3.1 Export diversification

Two centuries ago, David Ricardo (1817) showed that countries should specialise, not diversify. Each country has a comparative advantage in producing and exporting certain products, and specialising in these products will generate gains from trade. The absolute (or relative) comparative advantage theory argues that what really matters is how good a country is at producing a certain product compared to another. However, this theory has been criticised on many grounds. For most developing countries, increasing specialisation means focusing more on exporting raw materials and primary products in exchange for products manufactured in developed countries (Prebisch, 1950; Reinert, 2008).

Although it is argued that growth goes hand by hand with diversification (Acemoglu, 1997; Reiner, 2008), there is evidence that the relationship between economic development and diversification is non-monotonic. The two are positively correlated at low levels of development, but when countries reach a certain level of GDP per capita, the production tends to concentrate (Imbs and Wacziarg, 2003). Cadot et al. (2011) show that the hump-shaped pattern does not only hold for production and income, but also for export concentration and income. A potential explanation for this regularity is the existence of primary product exporters in their sample. For example, mineral product exporters are either low-income countries or very high-income ones. Unsurprisingly, they found the share of raw materials to be a significant contributor to export concentration in their sample.

There are three main explanations for the continuing export concentration patterns in resource rich developing countries: the Dutch disease-type phenomena, the presence of weak links, and the implementation of neoliberal policies. Dutch disease takes its name from

the discovery of large reserves of gas in the Netherlands in the 1960s. As the income generated from gas increased, the guilder appreciated significantly, which resulted in less competitiveness in the rest of the economy. The gas sector also increased its demand for production factors, which also decreased the competitiveness of the other sectors, including the manufacturing sector (Olarreaga and Ugarte, 2012). The other explanation, weak links, refers to work by Hirschman (1958), which stresses the role of complementarities and linkages in economic development. Low productivity in one non-tradable input will act as weak link in the whole production process. Hence, the presence of weak links may result in less diversified production because downstream sectors are affected by the high prices of non-tradable inputs. Olarreaga and Ugarte (2012) cite energy production as an example of weak links in resource rich countries, because it is required in most of the manufacturing sectors in the economy, therefore energy production may constrain diversification activity. This can take place if the energy sector suffers from low productivity, which implies higher costs for the energy users. The third explanation refers to adopting trade liberalisation, deregulating economic activity, and privatising public assets. Benvante et al. (1997) argue that neoliberal policies are the main contributor to the increase share of resource based exports in Latin America.

Krugman (1987) raises doubts about the practicality of government policies altering export concentration patterns in resource-rich developing countries. He expresses his doubts by arguing that these countries fall into a self-reinforcing effect of specialising in primary products, which acts as a development trap for them. The World Bank (1993) supports this argument by showing that selective government interventions in East Asia were unable to alter their comparative advantage. It rather emphasises the importance of “market friendly” policies for developing countries. The later view is inspired by the neoclassical trade theory,

which suggests that structural transformation is a passive outcome of the change in factor endowment. Thus, government intervention to create or shape the comparative advantage is not justified (Samen, 2010).

An alternative view argues that there might be some factors (or market failures) that make structural transformation much more complicated¹. An example of these factors is finding what a country can be good at producing (Hausman and Rodrik, 2003). This process creates information externality and helps in shaping the country's comparative advantage. Although discovering new activities has great social value, the initial entrepreneur who first exploits the activity only has a small portion of the generated value because of the emulation by other entrepreneurs in society. They show that governments need to encourage investment and innovation in new activities through different tools and policies. In order to promote innovation, governments can use “a variety of instruments such as trade protection, public sector credit, tax holidays, and investment and export subsidies. Clearly, all appropriate policy interventions need to increase the expected pay-off to innovation.” (P. 32). Other examples of market failures that affect structural transformation include: industry-specific learning by doing (Arrow, 1962); industry externalities (Jeffe, 1986), or technological spill-over (Jeffe, Trajtemberg and Henderson 1993).

There is a strand of the literature that provides evidence for the failure of free market policies in upgrading and diversifying the export structure of developing countries. Lall (1995) provides evidence of the failure of free market policies in Africa. In his paper, he presents the case of Ghana, which is considered to be the most advanced country in Africa

¹ Some argue that the export concentration problem is explained by the lack of structural transformation (Hausmann and Klinger, 2006). The study shows that upgrading and diversifying the production structure is a prerequisite for export diversification.

in terms of free trade and low tariff-based protection. He provides evidence that these policies resulted in significant deindustrialisation and little diversification in manufacturing goods. In another work by Lall (1980), he shows that India has a diverse and sophisticated export structure because of the protection of domestic learning in industrial manufacturing. He shows that both public and private sectors were active in the process, but the former role was predominant and crucial. Hobday (1995) and Westphal (1990) have revealed that new industrialised economies (NIE) in East Asia could not have achieved their industrial success without government selective policies targeting industrial upgrading (i.e. subsidies, tariffs, tax reduction, various kinds of licensing and the creation of public enterprises).

3.2 Finance and export diversification

There are three different strands of the literature that deal with financial development and its impact on export structure. The first strand shows the importance of financial markets by incorporating risk into trade markets. The second strand shows financial development as a source of comparative advantage. The third strand investigates the relation between credit, innovation, and industrial upgrading.

The first strand argues that the Heckscher-Ohlin-Samuelson (HOS) model of comparative advantage fails to address the problem of uncertainty about the world economic conditions faced by primary commodity exporters. Ruffin (1974) explains that the uncertainty in trade markets can be classified into two categories: uncertainty about general prices and uncertainty about foreign trade. The first refers to uncertainty about the production cost relative to the prevailing price when the product becomes available. Foreign trade uncertainty is a result of trading in international markets. This is due to the uncertainty in exchange rates, payments, and marketing costs. By accounting for these types of

uncertainty in his trade model, he shows that risk-averse producers of primary products will reduce their export specialisation according to their comparative advantage, that is, uncertainty will push primary product exporters toward greater export diversification. DeRosa (1992) supports this argument by incorporating uncertainty into the simple HOS model. He shows that uncertainty pushes risk-averse producers away from specialising in producing risky (primary) products. He also points out the important role of the financial markets in spreading the risk and directing resources to the country's most productive use. Greater economic development and diversification, he argues, can be achieved by "adopting more liberal economic policies toward domestic and international financial markets" (p.593). Acemoglu and Zibloti (1997) claim that economic diversification stimulates the development of the financial sector, which will in turn push the economy towards more diversification. They argue that diversification goes hand in hand with financial development.

On the other hand, some argue that financial development pushes the forces of comparative advantage toward specialisation. By incorporating international debt in his international trade model, Chang (1991) shows that financial development can provide LDC countries with insurance against the risk, which in turn allows them to specialise more in their exports basket. Saint-Paul (1992) tries to explain the stages of production and development by linking the financial market with technology choices. In his model, financial instruments are able to deal with the risk associated with the resource (labour or capital) being specialised in, in a narrower range of tasks; that is, financial markets lead to more specialisation. Alternatively, in the absence of financial markets, firms will choose technologies that are more flexible and less risky than otherwise, which results in more diversified production.

The second strand of the literature presents financial development as a source of countries' comparative advantage. Kletzer and Bardhan (1987) argue that countries with an identical endowment structure and no economies of scale might face different production costs because of credit imperfections. In particular, moral hazard considerations and imperfect information may lead some countries to face higher interest rates or rationed credit compared to other countries. This results in disparities in countries' comparative advantages for goods that require working capital, trade finance or marketing costs. In an earlier study, Baldwin (1985) developed a model with two countries and two goods. One of the goods is subject to demand shocks, while the other is not. He shows that economies with a developed financial system are more able to diversify their risks resulting from demand shocks, which allows firms to produce the risky good with lower risk premiums and at lower cost. Meanwhile, Kletzer and Bardhan (1987) stress the role of financial development in channelling finance to industries that require it more, and Baldwin (1989) focuses on the function of financial development in diversifying the risk faced by exporters. It is critical to note that the two studies assume no technology differences across countries.

In the theoretical part of his work, Beck (2002) shows that countries with well-developed financial systems tend to specialise in increasing return sectors. He presents an open economy model of two production technologies: the first is manufacturing (increasing return to scale) and the second is food (constant return to scale). In his model, financial development is assumed to lower the search cost, increase external finance and encourage the production of goods with increasing return to scale. The model predicts that economies with more developed financial systems are more likely to be net exporters of manufacturing products, which increase returns to scale products. In other words, he argues that trade patterns are determined by financial intermediation. In his empirical section, he finds that

countries with higher levels of financial development tend to have higher export shares in manufactured goods. In the context of resource rich countries, increasing the share of manufacturing relative to primary exports will result in greater export diversification. Thus, according to Beck's argument, the development of the financial system leads to greater export diversification in resource rich countries.

It is argued that industries that rely heavily on external finance profit from financial development more so than other industries. In their seminal study, Rajan and Zingales (1998) found that industrial sectors which require greater external finance grow faster in countries with higher financial development. They consider the dependence on external finance of firms in the US as a proxy for that the case in all other countries. The study assumes the degree of dependence on external finance to be based on technological reasons that vary from industry to industry. Hence, the study assumes that the technological reasons that are valid for US industry also apply to all other countries.

Following Rajan and Zingales (1998), export diversification in resource rich countries might benefit from financial development if the oil and mineral industries have relatively lower external finance dependence. If it is established that non-natural resource industries benefit more from financial development, then it can be argued that financial development might help resource-rich countries to push their exports away from primary products. Table 1 shows the external finance dependence for oil and mineral sectors according to their index; the higher ratio means greater external financial dependence.

Table 1: External finance dependence for oil and mineral sectors

Industrial sectors	External finance dependence
Non-ferrous metal	0.01
Petroleum refineries	0.04
Non-metal products	0.06
Iron and steel	0.09
Metal products	0.24
Petroleum and coal products	0.33

Source: Rajan and Zangales (1998).

The oil and mineral sectors show relatively lower external finance dependence (compared to others like the drugs and plastic sectors with 1.49 and 1.19 dependence respectively), which means that financial development might help to grow the other manufacturing sectors and reduce export concentration in resource-rich countries. However, Rajan and Zangales' (1999) argument has been criticised based on the theoretical measures of external finance. Kabango and Paloni (2009) raise doubts about the universality of the index for two reasons. First, there might be some country-specific institutional differences, which might affect the industrial sector's external financial dependence. For example, some industries receive some subsidies for strategic purposes, like food security. Second, the level of firms' external finance dependence might be underestimated because of capital expenditure.

While some of the neoclassical literature supports the argument that financial liberalisation promotes industrial and export upgrading, this view has been criticised for its abstracted and simplified modelling. Typically, standard investment models assume perfect capital markets. However, this assumption has been challenged recently by the capital

market's imperfection problem. For example, Carpenter and Peterson (2002) studied firms investing in new technologies and found that they face a large financing gap. This gap is due to three main reasons: First, the borrower's investment returns are highly uncertain, which might result in negative expected returns to creditors. Second, new technological investments entail high information uncertainty between firms and lenders. Third, new technology investments have small collateral value. In other words, there might be a large financing gap between the supply and demand for funds for new technology projects because of the problems of asymmetric expectation and limited collateral. Thus, Westphal (1990) argues about the importance of government's selective intervention in fulfilling this financing gap and allocating resources efficiently among the industrial activities. He gives the example of the Korean government, which "assured availability of adequate finance, by enabling exporters to borrow working capital in proportion to their export activity" (p.44). Moreover, after privatising the banking system in the early 1980s, the central bank (under government direction) continued regulating export financing.

Another critique of the finance diversification literature is based on technological progress considerations. Lall (2000) shows that neoclassical trade theory assumes fixed and fully diffused technology across countries. Exporters choose the most fitting technology relative to their endowment structure automatically. Then, they start using technology efficiently with no adaptation, transfer, or learning costs. In this framework, there is no distinction between technological capacity and capability². Given a homogeneous and rational labour force, inefficiency takes place only when governments intervene to hinder trade liberalisation. However, in practice, technology transfer is a crucial factor in choosing

² Technological capacity means equipment, physical plants, and blueprints, while capability means the producer ability to use the technology efficiently (Lall, 1998).

the production technology. For developing countries, the real technology transfer³ should include a process of assimilation, adaptation, modification or further innovation so that it can upgrade the technology base of the domestic economy (Mansfield, 1975).

The third strand of the literature looks at the relation between credit, innovation and industrial upgrading. In his discussion on the relationship between credit and innovation in the society, Schumpeter (1942) stated that "...credit is essentially the creation of purchasing power for the purpose of transferring it to the entrepreneur." Finance in this framework is a result of the entrepreneur's demand for capital while the banker is the capitalist authority that is able to create the purchasing power which enables the entrepreneur to produce. According to Schumpeter's analysis, the banking system has a central role in the process of innovation. However, applying Schumpeter theme of finance and production on the current capitalist economy entails many problems relating to the role of financial institutions in allocating the resources to serve industrialization. Firstly, there is an enormous discrepancy between private and social profits; secondly, investing in some projects comes with too high risk; and thirdly, information for borrowers and lenders is not always available. Thus, leading development economists such as Rodrik (2014), Amsden (1994), Lall (2000), Wade (1996) and Mazzucato (2013) have all recognized the need for policy guided finance that contributes to industrial upgrading. Mazzucato (2015) argues that "...Innovation requires patient, long-term finance and not just any type of finance." (p.3). Meanwhile, traditional banks look for short-term, profit maximizing investments and fear the fundamental risk associated with investing in new activities (Hadan, 2011; Kay, 2012).

³ In some developing countries, the technology transfer takes place only as an input in the production stage and does not add to the existing stock of domestic technology, i.e. the impact on the human capital skills is very limited. This kind of process is not considered as a real technology transfer; rather it is called a "pseudo-transfer" (Skarstein and Wangwe, 1986).

While industrial upgrading and diversification both require capital markets that are able to take on the associated risk, the evidence suggests that commercial banks are unable to differentiate between good and bad risks (Mazzucato, 2013). Bottazzi et al. (2011) found that the probability of receiving a bad credit score for productive firms is as high as it is for unproductive firms. The problem comes from the risk calculation method which does not consider the source of the risk; i.e. a firm investing in an innovative new production technique is very likely to have a high risk score. Thus, Cosh et al. (2009) found that since the financial crisis in 2008, the most innovative companies in the UK were the ones which suffered the most as a result of the increase in interest rates. The authors argue that this is explained by the innovative companies' high risk profile. Thus, Mazzucato (2013) urged policy makers to develop a new credit score mechanism that rewards innovators instead of penalizing them rather than helping banks to provide credit to innovative SMEs.

It is also documented in the literature that the financialisation process has had a significant impact on innovation and the production structure. Before the rise of neo-liberal policies in the US, Wall Street was an investment oriented market. However in the 1980s it was transformed into a trading oriented financial market. It is argued that this transformation is one source of the financial institutions' inability to invest in innovation and production. Instead, they make greater profit from speculation and other financial transactions (Lapavitsas, 2013, Mazzucato, 2013). Companies that have taken the lead in the innovation frontier, such as Microsoft, Cisco and General Motors, are investing in 'buyback' rather than increasing their spending in innovation and production expansion⁴ (Lazonick, 2007; Mazzucato, 2013; Stockhammer, 2004).

⁴ Some financial companies are spending large amount of their revenues on buying back their stock for two main reasons: raising the value of the stock price and making the stock price closer to the stock option associated with the executive pay (Lazonick,2007).

Because innovation is fundamentally a risky process and requires a long time to implement, some financial markets can penalize some companies investing in innovation and production upgrading. In 2006, Microsoft announced its intention to invest in a costly research project in order to produce a search engine capable of competing with Google. The following day Microsoft's stock price fell significantly which resulted in the loss of 32 billion dollars of Microsoft's market capitalization (Lazonick, 2007; Mazzucato, 2013).

In short, this strand of the literature argue that the private financial institutions are unlikely to play a significant role in promoting diversification and industrial upgrading on their own. Thus, governments are encouraged to support alternative sources of finance that are capable of funding these activities. These sources can take the form of industrial banks, development banks, publicly funded venture funds, policy guided finance programs or a vehicle that direct shares of public pension funds to high risk investments.

4 Export patterns in resource rich developing countries

Exported products are not the same with regards to their consequences for growth; some products bring more value and higher growth to the economy than others (Hausman et al., 2007). Technology intensive products promote higher future growth because they create new demand and substitute older products faster. They also open up areas for new knowledge and techniques that can be used in the future. On the other hand, simple technologies tend to be correlated with slower growth because of their limited potential and upgrading capacity. Moreover, simple technology markets are easier to enter for competitors and more substitutable by technical upgrading.

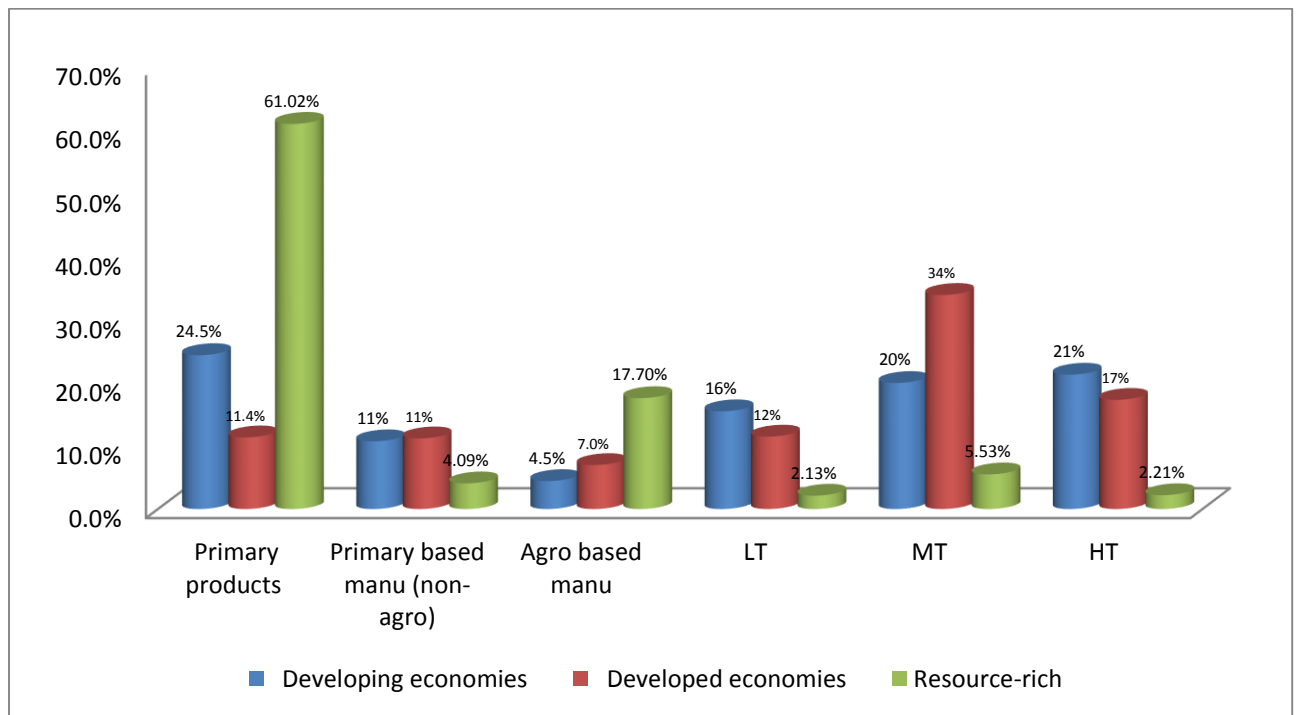
In this section, some basic export patterns in resource-rich developing countries will be examined and compared to the rest of the world. Export data based on technology

intensity, following Lall (2000), will be used. This classification has five main categories of exported products:

- Primary products (PP), for example, coal, crude petroleum, gas, ore concentrates, fresh fruit, and meat.
- Resource based (RB): this group includes simple manufacturing products, and has two sub segments: agriculture based products (e.g. prepared fruits, processed meat, and beverages) and other resource based products (petroleum products, base metals (except steel), cement, and gems). In general, these products arise from the availability of natural resources, and so they do not give an important indication about the competitiveness of the exporting country.
- Low technology (LT): this group has well-diffused and stable technologies. Barrier to entry and scale economies for LT products are generally low. Examples of these products are footwear, textile fabrics, plastic products, clothing, leathermanufacturing, furniture, jewellery, and toys.
- Medium technology (MT): this group tends to have scale and skill-intensive technologies. In mature economies, MT products are at the heart of industrial activity (e.g. automotive products and parts, motorcycles and parts, chemicals and paints, synthetic fibres, iron and steel, pipes and tubes, engines, industrial machinery, and ships).
- High technology (HT): these products comprise high R&D investment and rapid changing technologies. This group requires high level technology infrastructure and specialised technical skills (e.g. telecommunications equipment, television sets, cameras, transistors, optical and instruments, power generating equipment, pharmaceuticals, and aerospace.)

Figure 1 shows the shares of these five categories for resource-rich countries compared to the rest of the world. The export concentration in primary products is a significant trend in resource-rich countries; primary products make up 61 percent of their total exports compared to 24 percent and 11 percent for developing and developed countries.

Figure 1: Export shares based on technological intensity (Average 2009-2013)



Source: Author's calculations based on UNCTAD data.

The lack of technology based exports is another important trend in resource-rich developing countries; their shares of LT, MT, and HT exports are 2.1, 5.5, and 2.2 respectively. This trend raises the point made earlier regarding limited knowledge and technology spill-overs.

While resource-rich countries have on average a very large share of primary products, some countries have different patterns (see Table 2). Botswana, for example, has a primary exports share of 4.5 percent; however, its primary manufacture represents 83.4 percent of its total exports. Other countries have different patterns for technology-based manufacture. For instance, Mexico and Malaysia, who benefit from the existence of MNCs (Lall, 2000), have significantly high shares of LT, MT and HT relative to other resource-rich countries.

Table 2: Export shares based on resource rich developing countries (Average 2009-2013)

	Primary products	Agro-based manufacture	Primary products manufactures	Low tech manufacture	Medium tech manufacture	High tech manufacture
Algeria	84.3%	0.4%	15.0%	0.10%	0.13%	0.01%
Angola	96.8%	0.0%	2.2%	0.06%	0.80%	0.06%
Azerbaijan	90.3%	1.5%	4.9%	0.60%	1.42%	0.21%
Bahrain	24.6%	3.7%	46.3%	10.15%	11.86%	1.83%
Bolivia	64.7%	5.9%	20.5%	2.63%	1.32%	0.13%
Botswana	4.5%	1.4%	83.4%	3.20%	4.22%	1.59%
Brunei Darussalam	96.8%	0.1%	0.5%	0.81%	1.07%	0.31%
Cameroon	64.5%	15.0%	11.0%	2.83%	4.99%	0.85%
Chad	91.8%	0.2%	6.5%	0.34%	0.32%	0.66%
Chile	49.9%	12.4%	27.6%	2.48%	5.09%	0.74%
Congo	85.0%	2.8%	4.3%	0.12%	7.24%	0.26%
Dem. Congo	50.4%	2.7%	43.9%	0.21%	0.86%	0.20%
Ecuador	78.1%	9.0%	5.1%	2.49%	3.62%	0.54%
Equatorial Guinea	94.5%	0.9%	0.6%	0.01%	3.06%	0.26%
Gabon	75.9%	12.1%	9.2%	0.10%	2.04%	0.53%
Guinea	39.6%	1.5%	51.5%	0.27%	0.59%	0.39%
Guyana	19.2%	20.6%	13.2%	0.95%	2.39%	0.55%
Iran	73.1%	0.6%	9.7%	1.78%	7.93%	0.33%
Kazakhstan	77.3%	1.2%	9.3%	2.59%	4.62%	3.67%
Kuwait	74.3%	0.4%	17.0%	0.62%	6.83%	0.48%
Libya	89.2%	0.0%	7.9%	0.55%	1.33%	0.04%
Malaysia	17.8%	13.7%	7.7%	9.47%	16.40%	34.07%
Mali	32.7%	1.0%	4.8%	2.12%	6.51%	0.86%
Mexico	17.7%	3.6%	4.3%	9.07%	38.41%	23.99%
Mongolia	27.7%	0.4%	57.7%	2.25%	0.82%	0.27%
Nigeria	93.0%	0.3%	4.6%	0.83%	0.74%	0.10%
Oman	69.9%	1.6%	10.6%	1.40%	9.55%	0.67%
Papua New Guinea	28.6%	18.7%	24.5%	0.17%	0.76%	0.60%
Qatar	81.5%	0.0%	8.6%	0.89%	4.38%	0.09%
Russian Federation	54.6%	3.6%	21.8%	2.69%	7.89%	1.42%
Saudi Arabia	79.0%	0.8%	8.6%	1.34%	9.60%	0.27%
Suriname	6.1%	2.4%	19.7%	1.36%	1.41%	0.36%
Trinidad and Tobago	43.5%	2.3%	37.6%	2.35%	13.62%	0.23%
United Arab Emirates	50.0%	3.1%	17.2%	6.15%	11.63%	4.16%
Venezuela	71.5%	1.2%	18.7%	2.06%	5.82%	0.21%
Yemen	84.7%	1.9%	8.5%	0.43%	1.34%	0.23%
Zambia	74.7%	4.4%	10.6%	3.32%	3.97%	0.46%

Source: Author's calculations based on UNCTAD data

5 Empirical Framework

In this section, an investigation into the impact of financial development on export diversification in resource-rich developing countries will be conducted. Countries' richness in natural resources have been identified following the IMF (2012) definition. It considers a country to be rich in natural resources if it meets one of the two following criteria:

- i. The share of fiscal revenues from hydrocarbons or mineral resources was at least 25 percent of total fiscal revenue in the period (2006-2010), or
- ii. The share of hydrocarbons or mineral resources exports was over 25 percent of the total exports in the period (2006-2010).

Appendix 1 lists the resource-rich developing countries and the descriptive statistics that show their main natural resources and its share in total exports and fiscal revenue. In terms of the technique used in the study, we are going to use two different methods: panel fixed effect and panel cointegration estimation.

5.1 Fixed effect estimation

A panel approach is being used in this section because of three main advantages: First, a panel approach has the ability to benefit from the time-series and cross-section variation of the data. Second, a panel will provide a greater degree of freedom and more efficiency. Third, it has the ability to control for the presence of unobserved heterogeneity (Baltagi, 2014). Let us write our model in the following form:

$$EXCON_{it} = \beta_1 FD_{it} + \beta_2 CV_{it} + \varepsilon_{it} \quad (1)$$

Where $EXCON_{it}$ is the export concentration index in country i at time period t ,

FD_{it} measures for financial development, and

CV_{it} : is a set of control variables.

However, the literature suggests that when a large number of individuals are observed over time, specifying the nature of the disturbance term (ε_{it}) becomes difficult. For example, country specific or time period specific omitted factors might affect the observations. If these unobserved factors are not considered in the estimation, the ordinary least square (OLS) estimation applied to equation (1) might be both biased and inefficient. Hence, the model has been transformed to the following form:

$$EXCON_{it} = \beta_1 FD_{it} + \beta_2 CV_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

μ_i : is the unobserved time-invariant heterogeneity (while the remaining disturbance ε_{it} varies across both time and countries).

Where,

$$E[\mu_i] = E[\varepsilon_{it}] = E[\mu_i + \varepsilon_{it}] = 0 \quad (3)$$

which further assumes that ε_{it} and μ_i are independent for each country i over all the time period t .

Then, the Hausman test has been utilised to help decide whether the unobserved heterogeneity should be dealt with using random (RE) or fixed effect (FE). The test outcome does not support the use of the random effect. Hence, the fixed effect estimator has been used for the panel dataset. The Stata “robust” option has been employed to estimate the standard errors using the Huber-White sandwich estimators. The robust standard errors option is able to deal with the concerns over failure to meet the assumption of homoscedasticity (i.e. the presence of heteroskedasticity).

5.2 Panel cointegration approach

The second method in this study is the panel cointegration estimation. The main advantage of this approach is its ability to tackle the non-stationarity problem in panels. Thus, the time series dimension characteristics are considered carefully. We first begin this method by investigating the presence of unit roots in our panel dataset. Im, Pesaran and Shin (IPS) (2003) test is proposed for panels that contains information dimension in addition to the cross-sectional dimension. A crucial advantage of using IPS test is its ability to deal with unbalanced data⁵. The test begins by identifying the Augmented Ducky Fuller (ADF) regression for the N cross-section:

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad (4)$$

where y_{it} : is the variable under consideration

α_i : is the individual fixed effect

p_i : is the residuals uncorrelation term.

The null hypothesis is that the residual uncorrelation term is equal to zero ($p_i = 0$) for all i against the alternative hypothesis that it is less than zero ($p_i < 0$) for some i . After estimating the N separate ADF regressions, the average t statistics for p_i is calculated as follows:

$$\bar{t}_{NT} = \frac{1}{N} \sum_{i=1}^N t_{iT}(p_i, \beta_i) \quad (5)$$

⁵ Only Im–Pesaran–Shin (2003) and Fisher-type (Choi 2001) allow for unbalance panels, while the rest of the panel unit root tests (like The Levin–Lin–Chu (2002), Harris–Tzavalis (1999), Breitung (2000; Breitung and Das 2005) allow only for balanced panels.

Once we confirm our variables to be stationary, we then test the existence of long run cointegration among the dependent and explanatory variables. In this study we implement Kao (1999) test that uses both DF and ADF to test for cointegration in panels.

There are several panel estimation frameworks proposed in the presence of cointegration: Dynamic OLS (DOLS) and Fully Modified OLS (FMOLS) for static panels; while Dynamic Fixed Effect (DFE), Mean Group (MG), and Pooled Mean Group (PMG) are proposed for dynamic panels. In this paper, we adopt the DOLS estimator.

Pedroni (1996) proposed the FMOLS that is capable of fixing the pooled OLS for the endogeneity of regressors and correcting the serial correlation that usually present in long-run estimations. Another estimator proposed by Kao and Chiang (2000) for non-stationary panels is the Dynamic Ordinary Least Square, which is an extension of Stock and Watson's (1993). Kao and Chiang (2000) use Monte Carlo experiments to show that the FMOLS do not improve over the bias-corrected OLS estimator in general, and that the DOLS outperforms them in estimating panel cointegration regressions. The starting equation for the DOLS is the following:

$$y_{it} = \alpha_i + \beta_{1i}x_{1it} + \beta_{2i}x_{2it} + \dots + \beta_{Mi}x_{Mit} + e_{it} \quad (6)$$

To correct for the serial correlation and the endogeneity, the DOLS uses parametric adjustment to the errors of the static regression by including past and future values of the regressors in difference I(1).

$$y_{it} = \alpha_i + x'_{it} \beta + \sum_{j=-q_1}^{j=q_2} c_{ij} \Delta x_{i,t+j} + v_{it} \quad (7)$$

where c_{ij} is the coefficient of either lead or lag of the explanatory variable at difference.

$$B_{DOLS} = \sum_{i=1}^N \left(\sum_{t=1}^T Z_{it} Z'_{it} \right)^{-1} \left(\sum_{t=1}^T Z_{it} \tilde{y}_{it} \right) \quad (8)$$

Where $Z_{it} = [x_{it} - \bar{x}, \Delta x_{i,t-q}, \dots, \Delta x_{i,t+q}]$

The DOLS can be estimated in three ways: weighed, unweighted, and mean-group estimations. Mark and Sul (2001) study the performance of the three DOLS estimators for small samples. In terms of precision, they argue that the weighted and unweighted estimators outperform the mean-group. In addition, they show that the unweighted estimator displays smaller size distortion and more precise than the weighted estimator. Thus, we employ the unweighted DOLS in this study.

5.3 Data description

- Export diversification

Looking the literature on export diversification and its relation to growth, the most commonly used indicator for export diversification is the Herfindhal-Hirschman index (HI). The index lies between 0 and 1, where lower values indicate more diversification. The index computes the sum squares of export shares, as in the equation:

$$HI = \frac{\sum_{k=0}^n \left(\frac{x_k}{X}\right)^2 - \frac{1}{n_i}}{1 - \frac{1}{n_i}} \quad (9)$$

X: is the total share of exports by a country i

x: is the export value of product k from country i,

n: is the number of products exported by country i.

There are two factors that lead to a lower HI value: a large number of n_i exported products, or a fall in the share of each product. A product to be considered in this index must have an export value higher than 100,000 dollars, or represent more than 0.3 percent of the total exports of a nation (SITC revision3 at a 3 digit level). In this study, the HI has been utilised for the available period (1995-2013) from the UNCTAD dataset.

- Financial development:

Private credit to GDP is the most common measure of financial development in the literature. This ratio represents the size of bank loans relative to the output of the economy. However, looking only at this indicator does not provide a sufficient assessment, because it does not provide us with any information regarding the other components of the financial sector besides banks. In other words, credit to private sector says nothing about the financial sector's efficiency, quality or stability (Cihak et al., 2012). However, because it is not possible to measure these characteristics, this study will use six different proxies of financial institution depth that are available for all of the sample countries.

The financial depth indicators used in the study are: domestic credit to private sector, bank deposits to GDP, deposit money banks' assets to GDP (banking size), financial system deposits to GDP, deposit money banks' assets to deposit money bank assets and central bank assets, and M2 to GDP.

- GDP per capita

Richer countries tend to have institutional and economical stability, which reduces the business risk faced by domestic producers and results in higher economic diversification. Acemoglu and Zilibotti (1997) argue that economic development goes hand in hand with market diversification, and Reinert (2007) show that wealth and economic development should always be coupled with diversified economic activity. However, in resource-rich developing countries, export diversification might not be correlated positively with GDP per capita (Cadot et al., 2007).

- Trade openness

The sum of exports and imports to GDP is used in this study as a proxy for trade openness. Reinert (2007) argues that trade liberalisation leads developing countries to specialise more in exporting simple and primary products. Empirically, Agosin et al (2012) use the sum of exports and imports to GDP as an indicator of trade openness, and found that it has a negative impact on export diversification. On the opposite side, Cadot et al. (2009) studied the impact of trade openness on export diversification using a dummy variable for trade liberalisation (reforms); although it was increasing before the reforms, they found a significant positive impact from trade liberalisation on export diversification.

- Population

Klinger and Liderman (2004) found that discovery is a major determinant of economic diversification. They also found that the higher the country's population, the more likely it is to discover new products. In other words, population growth induces economic diversification. Following Chandra et al. (2007), we expect the natural logarithm of the population size to have a positive impact on export diversification.

- Real effective exchange rate (REER)

Gutierrez and Ferrantino (1997) found a positive impact of real exchange rate depreciation on export diversification. In this study, the REER data have been retrieved from the Darvas (2012) database.

- Fixed capital formation

Gross fixed capital formation can promote economic diversification because it can expand the capacity of the economy, which might result in higher export diversification.

Habiyaremye and Zieseemer (2006) found that investment in infrastructure induces export diversification in Sub-Saharan Africa.

5.4 Data specification

The dataset covers the period between 1995 and 2013 for 38 resource-rich developing countries. The time period was determined by the availability of data on export concentration. A summary statistics of the variables employed in this study is shown in Table 3. The export concentration has an overall mean of 55.4 percent with a significant variation between the sample countries; Mexico has the most diversified exports basket with an average HI of 13.9 percent, while Angola on the other hand has the least diversified export basket with an average HI of 96.7 percent. Figure 2 shows the export concentration for the sample average (resource-rich developing countries) compared to developing and developed countries. In the period (2008- 2013), resource-rich countries had an average HI of 56.7 percent compared to 13.0 and 6.5 percent in developing and developed countries respectively.

Figure 2: Export concentration (1995-2013)

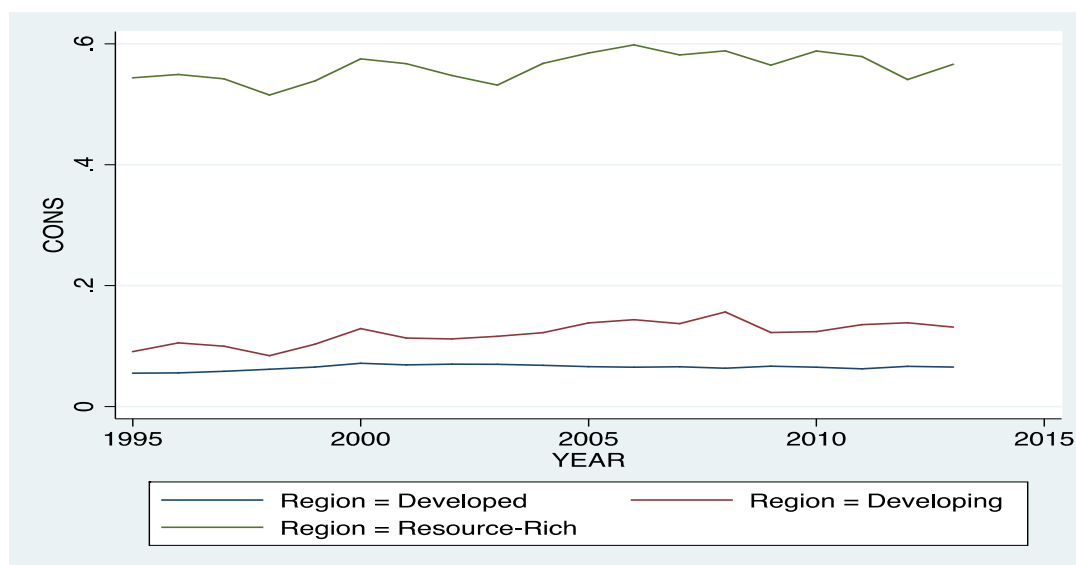


Table 3: Summary of statistics for the used variables annually (1995-2013)

Variable		Mean	Std. Dev.	Min	Max	Observations
Export Concentration	overall	0.5542174	0.2029448	0.1132714	0.9676921	N = 720
	between		0.1895365	0.1390221	0.9237195	n = 38
	within		0.0778618	0.2415596	0.9032057	T = 18.9474
Ln credit to private sector	Overall	2.846238	1.011685	-1.618047	5.065785	N = 710
	Between		0.9378029	0.5449037	4.800148	n = 38
	Within		0.440311	0.6832873	4.062514	T-bar = 18.6842
Ln bank deposits	Overall	3.081202	0.8209696	0.1478631	4.869511	N = 647
	Between		0.7662481	1.411656	4.718423	n = 38
	Within		0.3286049	1.6457	4.232388	T-bar = 17.0263
Ln bank assets	Overall	3.047459	0.9534034	-0.6914147	5.101225	N = 647
	Between		0.8980727	0.9778978	4.823277	n = 38
	Within		0.4020549	1.312575	4.527678	T-bar = 17.0263
Ln bank to CB	Overall	4.314307	0.3810758	2.519276	4.605159	N = 622
	Between		0.2947071	3.293498	4.60249	n = 37
	Within		0.2493803	2.656946	5.16551	T-bar = 16.8108
Ln financial system deposits	Overall	3.092168	0.8247873	0.1478595	4.869509	N = 647
	Between		0.7709889	1.411656	4.718423	n = 38
	Within		0.3253583	1.656662	4.239926	T-bar = 17.0263
Ln M2 to GDP	Overall	3.447051	0.6948311	0.4806684	4.968378	N = 711
	Between		0.6510157	1.763749	4.866339	n = 38
	Within		0.2902308	1.479912	4.405052	T-bar = 18.7105
Ln GDP per capita	Overall	8.006567	1.465803	4.631483	11.448	N = 722
	Between		1.355621	5.431023	10.64643	n = 38
	Within		0.5972848	5.280037	9.584973	T = 19
Ln trade openness	Overall	4.376587	0.4771415	2.692765	6.27615	N = 666
	Between		0.450711	3.400332	5.506435	n = 38
	Within		0.1812551	3.630428	5.146302	T-bar = 17.5263
Ln fixed capital accumulation	Overall	22.28488	1.790415	18.47785	26.83304	N = 629
	Between		1.646482	19.1197	25.76894	n = 37
	Within		0.7507066	19.87123	24.39761	T-bar = 17
Ln population	Overall	15.84261	1.602884	12.59474	18.97235	N = 722
	Between		1.613989	12.78594	18.79154	n = 38
	Within		0.1712025	15.20993	16.72218	T = 19
Ln REER	Overall	4.637849	0.2572778	3.492339	6.110084	N = 722
	Between		0.1525241	4.351316	5.203924	n = 38
	Within		0.2085882	3.778872	5.595299	T = 19

5.5 Empirical results

5.5.1 Fixed effect estimation

The FE regression results show the impact of FD on export concentration using six different financial depth indicators. The results suggest that financial development has no significant impact on export concentration across all the FD indicators used in the study (Table 5). This is to say that financial development is not suggested to be a determinant of export diversification. These results are in line with both Agosin et al. (2012) and Bebczuk and Berrettoni's (2006) findings. On the other hand, Cadot et al. (2010) and Chndra et al. (2007) have not mentioned financial development as a potential determinant of export diversification.

Our first explanatory variable is GDP per capita, which has a positive and significant coefficient. In other words, GDP is suggested to induce export concentration. This result can be explained by the fact that GDP per capita for the countries in our sample does not only represent the economic development taking place in the countries, but also shows fluctuations in energy and mineral prices. For example, looking at the average GDP per capita for the sample, it has risen from 2255 dollars in 2003 to 7563 dollars in 2013 following the commodity prices increase. Another explanation for the positive impact of GDP per capita on export concentration is due to the private sector's incentive to make greater profits at lower risk by specialising in products according the country's comparative advantage. This finding is line with Bebczuk and Berrettoni's (2006) results.

The positive and significant trade openness coefficient suggests that trade openness promotes export concentration, which is in line with Reinert's (2007) argument and the empirical findings of Agosin et al. (2012). The negative and significant coefficient of fixed capital to GDP suggests that fixed capital formation reduces export concentration, which supports Chandra et al. (2007). REER has a positive and significant sign, which predicts that real effective exchange rate appreciation induces export concentration; this result supports Gutierrez and Ferrantino's (1997)

finding. Finally, the results suggest that countries with higher population size tend to have less concentrated exports, which is in line with the results of Chandra et al. (2007).

Table 5: The impact of financial development on export concentration using FE estimator

Dependent variable: Export concentration	1	2	3	4	5	6
Ln private credit to GDP	-0.010 (0.021)					
Ln M2s to GDP		-0.021 (0.026)				
Ln bank deposits to GDP			-0.038 (0.033)			
Ln banks assets to GDP				-0.021 (0.023)		
Ln financial system deposits to GDP					-0.039 (0.033)	
Ln banks to CB						0.024 (0.044)
Ln GDP per capita	0.089 *** (0.012)	0.089*** (0.012)	0.098*** (0.015)	0.092*** (0.015)	0.098*** (0.015)	0.086*** (0.016)
Ln trade openness	0.156 *** (0.052)	0.157*** (0.053)	0.158*** (0.055)	0.158*** (0.055)	0.158*** (0.055)	0.155** (0.058)
Ln population	-0.156*** (0.050)	-0.153*** (0.051)	-0.152** (0.071)	-0.154** (0.072)	-0.152** (0.071)	-0.206*** (0.072)
Ln REER	0.059* (0.032)	0.060* (0.032)	0.060 (0.039)	0.063* (0.0370)	0.059 (0.039)	0.061* (0.034)
Ln fixed capital accumulation	-0.055** (0.033)	-0.055** (0.023)	-0.047** (0.022)	-0.050** (0.0217)	-0.047** (0.023)	-0.057** (0.024)
Cons	1.33 (1.86)	1.31 (1.700)	1.275 (1.195)	1.301 (1.194)	1.281 (1.192)	2.012 * (21.167)

The robust standard errors are presented in parentheses under the coefficients

***, **, * show 1% 5% 10% significant levels respectively

5.5.2 Panel cointegration estimation

Table 7 reports the IPS panel unit root test for our variables at level and first difference. The results clearly show that the null hypothesis of a unit root cannot be rejected in level for the majority of the variables. However, the table reveals that the hypothesis is rejected when the

variables are in first difference⁶. The exception was the population size variable, which is not stationary in first difference. Thus, it has been eliminated from the model. Then, we check the panel cointegration using Kao residual cointegration test. Table 8 reports six test outcomes; each financial depth indicator is tested once at a time with the other variables. The low p-values for the six tests give us a strong evidence of long run relationships between export concentration and our right-hand side variables⁷.

Having found that there is cointegrating links between our RHS variables and export concentration, Table 9 shows the panel cointegration estimation using the DOLS estimator. The coefficient of the credit to private sector, which is our most important financial depth indicator, is significant and positive. This means that credit to private sector is expected to induce export concentration. The results also show that the other financial depth indicators have no significant impact on export concentration. It is also important to note that our control variables are robust across the six regressions; all the control variables are significant and have the expected impact discussed in section 4.5.1⁸.

Table 7: IPS panel unit root test

IPS unit root test *	Level		1st difference	
	statistics	P-value	statistics	P-value
Export concentration	-0.99	0.18	-12.36	0.00
Ln credit to private	0.54	0.70	-14.05	0.00
Ln M2	0.63	0.74	-17.18	0.00
Ln bank deposits	1.69	0.95	-12.85	0.00
Ln bank assets	0.04	0.52	-11.43	0.00
Ln banks to CB	-4.83	0.00	-17.63	0.00
Ln financial system deposits	1.13	0.87	-12.81	0.00
Ln GDP per capita	6.70	1.00	-13.03	0.00
Ln REER	-0.22	0.41	-13.71	0.00
Ln Trade openness	-1.87	0.03	-15.58	0.00
Ln Fixed Capital to GDP	-3.41	0.00	-20.57	0.00

- Null hypothesis: the existence of unit root

⁶ Fisher-type test (Choi, 2001) is also implemented for robustness. The test outcomes are very consistent with the IPS reported test.

⁷ For robustness, Pedroni (1999) cointegration test is implemented. The majority of the results suggest a long run relationship.

⁸ While the reported results show the unweighted DOLS, we estimated the weighted DOLS and its results are very consistent with the reported ones. Also, we estimated the FMOLS estimator, and its outcomes suggest that financial development has no significant impact on export diversification using the six financial depth indicators.

Table 9: Kao Residual cointegration test

Series	t-statistics	P-value
Series 1 (Ln credit to private)	-2.02139	0.021
Series 2 (Ln M2)	-2.6119	0.004
Series 3 (Ln bank deposits)	-2.88854	0.001
Series 4 (Ln bank assets)	-2.54113	0.005
Series 5 (Ln banks to CB)	-1.74077	0.040
Series 6 (Ln financial system deposits)	-2.88153	0.002

* Null hypothesis: no cointegration

Table 9: Panel cointegration estimation using the DOLS estimator

Dependent variable: Export concentration	1	2	3	4	5	6
Ln private credit to GDP	0.019 * (0.010)					
Ln M2s to GDP		-0.001 (0.018)				
Ln bank deposits to GDP			-0.013 (0.018)			
Ln banks assets to GDP				0.001 (0.011)		
Ln financial system deposits to GDP					-0.012 (0.018)	
Ln bank deposits to CB						0.032 (0.028)
Ln GDP per capita	0.048*** (0.007)	0.057*** (0.008)	0.067*** (0.009)	0.063*** (0.007)	0.067*** (0.009)	0.051*** (0.008)
Ln trade openness	0.225*** (0.026)	0.227 *** (0.028)	0.251*** (0.026)	0.262*** (0.026)	0.250*** (0.026)	0.220*** (0.029)
Ln fixed capital to GDP	-0.110*** (0.017)	-0.090*** (0.017)	-0.099*** (0.017)	-0.096*** (0.018)	-0.099*** (0.017)	-0.077 *** (0.019)
Ln REER	0.078*** (0.022)	0.098 *** (0.023)	0.075 *** (0.022)	0.086 *** (0.023)	0.074 *** (0.022)	0.108*** (0.023)

***, **, and * show 1%, 5%, and 10% significant levels respectively

6 Conclusion

In this study, we investigate the impact of developing the financial sector on export concentration in 38 resource-rich developing countries for the period 1995-2013. Our results

suggest that financial development can have a positive impact on export concentration. The finding could be explained by arguing that “a well-developed domestic financial system helps to push the country’s exports towards products congruent with its comparative advantage” (Jaud et al., 2012, p.3). This is because traditional banks look for short-term, profit maximizing investments and fear the fundamental risk associated with investing in new activities (Hadan, 2011; Kay, 2012). Hence, financial development in resource-rich developing countries might benefit projects related to primary and low technology products. One policy implication of our findings is that upgrading the export structure require policy guided, long-term and patient finance. Thus, governments are encouraged to provide alternative sources of finance that are capable of fulfilling this gap. These sources can take the form of development banks, industrial banks, and publicly funded venture funds.

Appendix 1: Resource-rich developing countries: descriptive statistics

Country	Resource	Resource Exports in percent of total exports- Average (2006-2010)	Resource revenue in percent of fiscal revenue- Average (2006-2010)
Algeria	Oil	98	73
Angola	Oil	95	78
Azerbaijan	Oil	94	64
Bahrain	Oil	81	82
Bolivia	Gas	5	32
Botswana	Diamond	66	63
Brunei Darussalam	Gas	96	90
Cameroon	Oil	47	27
Chad	Oil	89	67
Chile	Copper	53	23
Congo, Republic	Oil	90	82
Congo, Democratic	Oil and Minerals	94	30
Ecuador	Oil	55	24
Equatorial Guinea	Oil	99	91
Gabon	Oil	83	60
Guinea	Mining products	93	23
Guyana	Gold and Bauxite	42	27
Iran	Oil	79	66
Kazakhstan	Oil	60	40
Kuwait	Oil	93	95
Libya	Oil	97	89
Mali	Gold	75	13
Malaysia	Oil	8	37
Mexico	Oil	15	36
Mongolia	Copper	81	29
Nigeria	Oil	97	76
Oman	Oil	73	83
Papua New Guinea	Mineral and petroleum	80	32
Qatar	Gas	88	58
Russia	Oil	50	29
Saudi Arabia	Oil	87	79
Sudan	Oil	97	55
Suriname	Minerals	11	29
Trinidad and Tobago	Gas	38	49
UAE	Oil	91	54
Venezuela	Oil	93	58
Yemen	Oil	82	68
Zambia	Copper	72	4

Source: IMF (2012)

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