Economic Diversification:

Dynamics, Determinants and Policy Implications

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1. Introduction

Economic diversification is vital to long-term economic growth. Vibrant economies usually generate a large share of their GDP in the manufacturing and service sectors. When the economy heavily depends on income originated in the agriculture and mining sectors, sustaining long-term economic growth is challenging because of volatility in commodity prices and allocative inefficiencies, productivity growth in these sectors is slower than in others. This policy challenge is especially salient in resource-dependent countries. They tend to underperform, in part, because their economies heavily rely on the extractive sector for generating foreign exchange and budget revenues. In particular, the presence of abundant natural resources hurts macroeconomic stability, crowds out the manufacturing sector, increases the likelihood of civil unrest, and undermines democratic institutions (Corden and Neary 1982; Mehlum, Moene, and Torvik 2006; Ross 2006; Tornell and Lane 1999). To remedy this situation, governments need to develop and implement effective economic diversification strategies.

 To stimulate a policy debate on economic diversification, this paper examines the determinants of economic diversification across countries over time. Specifically, we analyze diversification patterns and investigate factors that have influenced economic and export diversification. We argue that an abundance of natural resources creates better conditions for economic diversification while export diversification efforts encounter difficulties in resource-dependent countries. Both economic and export diversification require substantial financial resources, and it is obvious that countries with a wealth of natural resources benefit from them. However, when a country exports natural resources, foreign exchange inflows into the economy grow, making the national currency of this country more expensive compared with foreign currencies. Strong currency reduces competitiveness in the global markets and slows down the export diversification process.

The analysis finds that the level of economic and export diversification is significantly lower in resource-rich countries compared with advanced economies and emerging markets. The central finding of this study is that in resource-dependent countries natural resources help economic diversification, yet hamper export diversification efforts. Furthermore, this study demonstrates that infrastructure and the quality of institutions have a strong impact on the magnitude of economic diversification. These findings suggest that governments should develop policies directed at reducing corruption and improving government effectiveness to foster economic diversification. The results also imply that unless the governments take measures to offset a negative impact of large foreign exchange inflows into the economy, they will have limited progress in their export diversification efforts.

To date, few resource-rich states have diversified their economies out of the extractive sector into non-resource sectors. In this regard, the experiences of Chile, Indonesia and Malaysia stand out. From 1970 to 2008, the share of mining products in total Chilean exports declined from 85.5 percent to 58.7 percent, while the share of manufactured goods in total exports increased from 11.6 percent to 35.3 percent. In Malaysia, the share of agriculture in GDP fell from 26.7 percent in 1970 to 7 percent in 2005, whereas manufacturing's share increased from 12.2 percent to 35.8 percent.

Moreover, in the wake of the recent global downturn, the experience of resource-dependent countries provides compelling evidence that without economic and export diversification these economies remain highly vulnerable to various external shocks. Neither the creation of special resource funds nor rigid fiscal rules can fully shelter them from the negative impact of excessive fluctuations in commodity prices. These countries lack clear policy guidelines on how to effectively diversify their economies and export portfolios. In addition, policy makers and development experts do not seem to fully understand the forces driving the diversification process; nor do they seem to know what public policies lead to new products and effectively promote the process of innovation, imitation, adaptation and technological change.

The rest of the paper is organized as follows. Section Two defines key concepts, presents the rationale for diversification, discusses major policy issues, and analyzes recent diversification patterns across countries. Section Three presents empirical findings, and the final section contains the conclusion and main policy recommendations.

2. Patterns of Diversification

Key Terms

Economic diversification falls into two major types: economic (product) diversification and export diversification. Economic diversification is generally defined as the process in which the economy becomes more diverse in terms of goods and services it produces. Export diversification refers to deliberate policies intended to change the shares of commodities in the existing export mix, introduce new products in the export portfolio, and/or break into new geographical markets. Both types are believed to propel economic growth, create an environment conducive to productive investment, and reduce short-term macroeconomic volatility.

At the national level, economic diversification takes place by reducing a country's overdependence on a narrow economic base. In resource-dependent countries the process entails moving the production base away from the extractive sector by supporting manufacturing and other nonresource sectors. This process can be broadly defined as industrialization.

The current policy debate about economic diversification centers around two competing strategies of industrialization: import substitution industrialization and export-led industrialization. The objective of import substitution industrialization is to promote domestic industries to replace foreign-made goods for domestic goods; export-led industrialization intends to speed up the industrialization process by opening domestic markets for foreign competition and by supporting export sectors. In this debate, the

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economic performance of the newly industrialized Asian economies is often contrasted with development experience of Latin American and African countries in the 1970s. While larger Latin American countries such as Argentina, Brazil and Mexico had some success with the import substitution strategy, smaller and poorer countries failed to industrialize their economies strictly following inward-oriented policies. In stark contrast, the successful industrialization experience of some Asian nations, including Malaysia and South Korea, is largely attributed to their export-promoting policies, rather than import substitution strategies. In terms of policy options, countries that adopted import-substitution strategy relied on more direct government interventions in the economy, while export-led industrialization is mostly associated with creating incentives that indirectly influence the behavior of economic agents.

At the industry level, the diversification debate boils down to the selection of particular industries that have the potential to expand and ultimately develop sufficient capacity to compete with advanced economies in the global market. Although governments possess powerful policy instruments in their policy toolbox to stimulate structural change and the diversification process, choosing the right instruments determines success in the long run. Another challenge is to identify and take into consideration policy constraints on diversification. Reflecting these concerns, the debate at this level deals with identifying and deploying appropriate policies and policy tools. Even though the importance of industrial policies in encouraging diversification is widely recognized, there are divergent views on whether vertical industrial policies, which involve "picking winners," can successfully be adopted in resource-dependent countries characterized by weak institutions.. In Eastern Europe, for example, governments have refrained from picking winners and placed more emphasis on improving the general business environment.
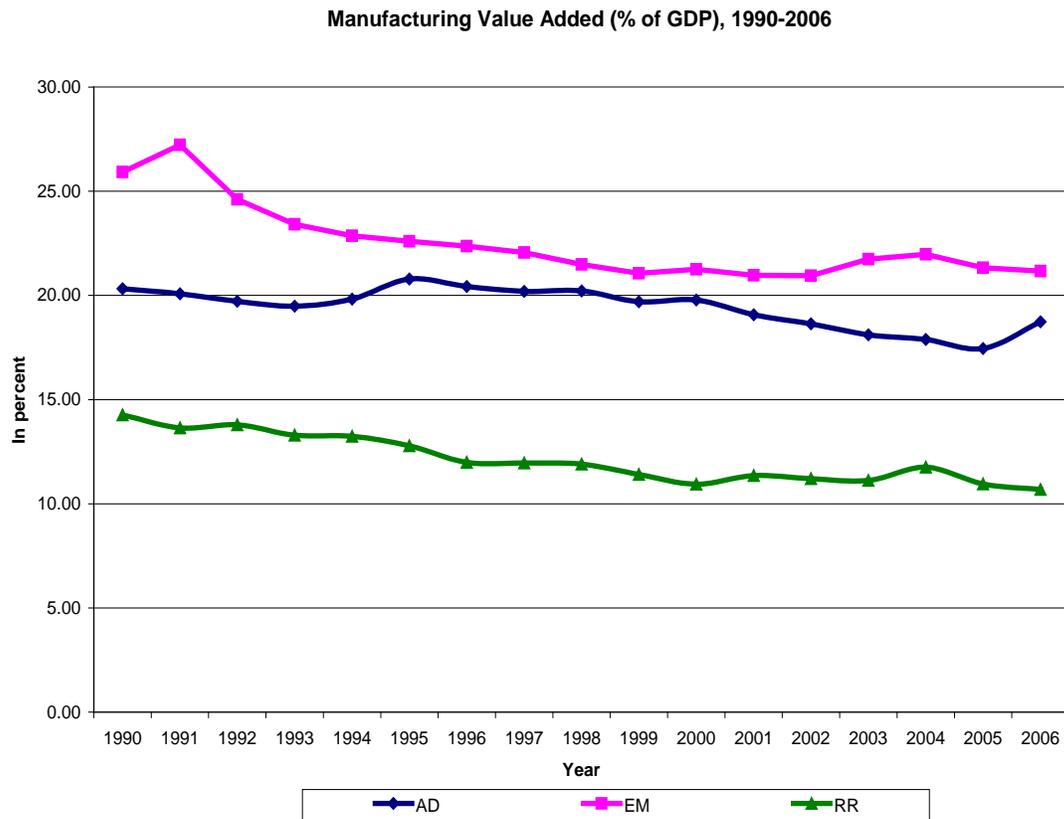
Diversification Trends and Dynamics

Figure 1 plots manufacturing, value added (output), as a percent of GDP for advanced economies, emerging markets and resource-rich countries. As shown here, the trends

for emerging markets and resource-dependent countries are similar. This figure also illustrates that manufacturing, value added, as a share of GDP changed little in advanced economies from 1990 to 2006, whereas emerging markets and resource-dependent countries experienced far larger changes. The figure also shows that the manufacturing sector's contribution to GDP was about 14 percent in resource-rich countries in 1990; since then, it has slightly declined reaching approximately 11 percent of GDP in 2006. The manufacturing sector's share n in GDP remained stable in advanced economies, while it lost some ground in the emerging markets.

As industrialization takes place, the structure of the economy changes and countries' income grows, leading to improvements in standards of living. High-income countries are more industrialized, and the manufacturing sector's share in GDP is higher in these countries compared with less developed ones. As countries develop, the manufacturing and service sectors tend to grow faster, compared with the primary sectors. It appears that the manufacturing sector in resource-rich countries has not been expanding along the path observed during the earlier stages of development in high-income countries. If this pattern is not reversed, the structure of the economy in resource-dependent countries will continue to be dominated by the nontradable and mining sectors, thus hurting future growth prospects. Overall, resource-rich countries made little progress toward increasing manufacturing's share in GDP during the sample period.

Figure 1

**Manufacturing Value Added (% of GDP), 1990-2006**

Source: World Bank Data.

Figure 2 presents the dynamics of export diversification in advanced economies (AD), emerging markets (EM) and resource-rich countries (RR). The larger values of this index indicate less export diversification. The figure clearly demonstrates that resource-rich countries are far less diversified in terms of their export baskets (products they export), compared with emerging markets and advanced economies. Furthermore, the trend in the export diversification index for resource-rich countries fluctuates during the sample period; since the turn of the century, it began to rise, reflecting improvements in commodity prices. This trend indicates that diversification efforts of these countries failed to produce measurable improvements between 1980 and 2006. Contrary to this trend, the diversification index in the emerging markets exhibited a downward trend,

reflecting improvements in the export diversification index in these countries. The export diversification index for advanced economies did not change.

Figure[1] 2

**Herfindahl Index of Export Diversification, 1980-2006**
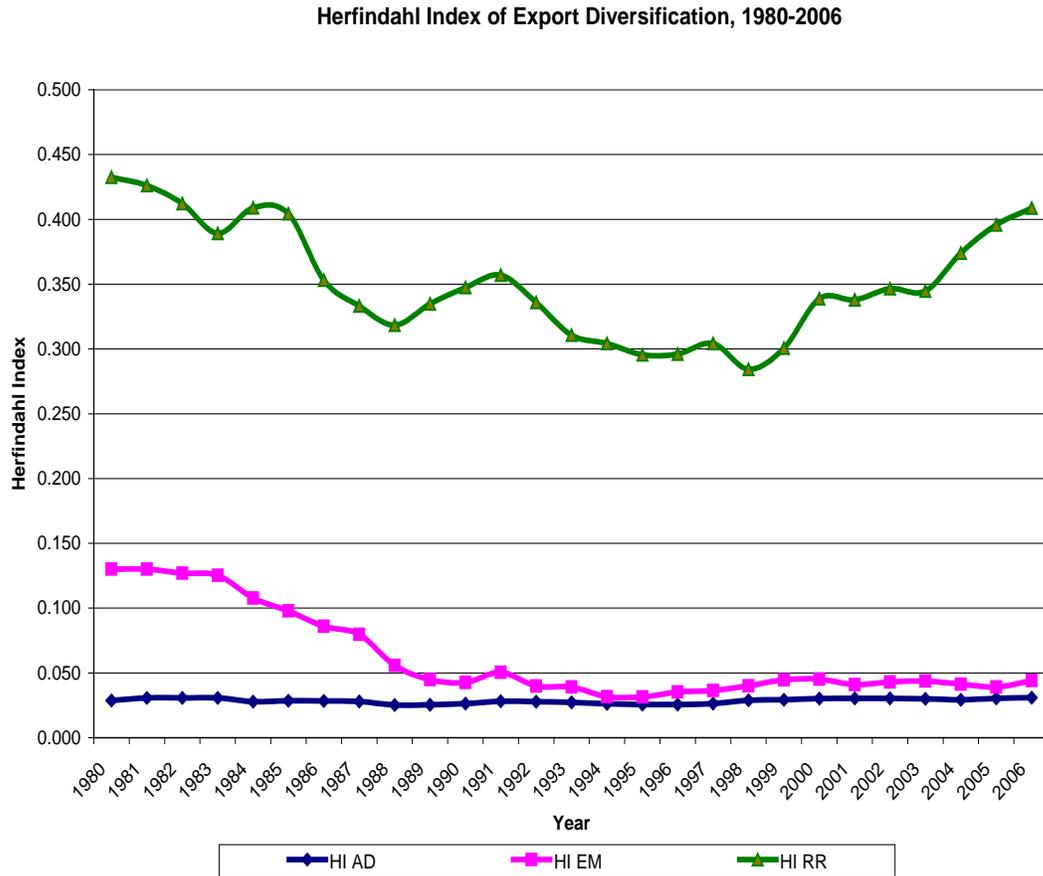
Source: World Bank.

Figure 3 shows the time trend of the export sophistication index for a large set of countries. This measures the technological sophistication of products these countries export. Larger values of the index indicate more sophistication. Products that advanced economies export are assumed to be more sophisticated than those exported by less

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[1] The Herfindahl-Hirschman Index (HHI) measures the extent to which a country's production or trade is diversified or specialized. The index is bounded by 0 to 1, and a high value of the index indicates that the country is specialized in the production of a few goods. The index is simply the sum of the squares of the market shares for each industry and is always less than one.

developed ones. The cross-country analysis, however, provides additional insights. The level of export sophistication in the emerging markets is significantly higher than in resource-rich countries. Throughout the sample period, the products emerging markets exported became more technologically sophisticated.

Figure 3*

Export Sophistication Index, 1980-2006
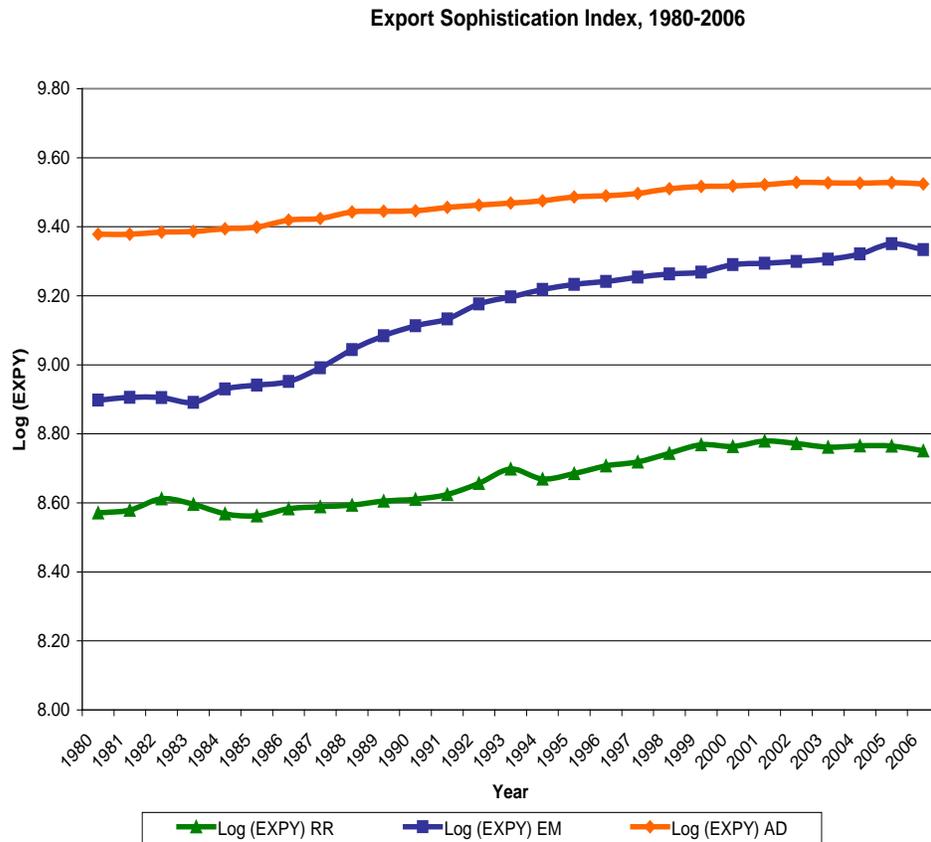
* The logarithm form Log (EXPY) is used to make the scale smaller.
Source: World Bank

The gap between the emerging markets and resource-rich countries in terms of product sophistication has widened over the past two decades. Even though some resource-rich countries like Mexico, Russia and Saudi Arabia have per capita GDP levels that are comparable or higher than some emerging markets like China, the Philippines and Turkey, the values of the export sophistication index for the resource-rich ones are

lower, indicating that exports there are heavily based on natural resources and the non-resource products they export are technologically less sophisticated. These findings support the argument that countries that export more technologically sophisticated goods tend to grow faster than countries specialized in exports of less sophisticated ones. And long-run economic growth is strongly affected by the types of products exported. For instance, Russia's export portfolio is mostly comprised of hydrocarbons, while Malaysia exports high-tech products such as electronics and has higher values for export sophistication.

In sum, this analysis demonstrates that the efforts resource-rich countries recently made to diversify their economies away from the natural resource sector brought lackluster results. With few exceptions, these countries remain poorly diversified. In addition, the structure of the economy and the export portfolio of advanced economies experienced modest changes over the past two decades. In contrast, the emerging markets made significant improvements in terms of export diversification and development of technologically sophisticated products.

3. Discussion of Empirical Findings

This section presents the results of statistical analysis to identify key determinants of economic and export diversification.[2] The analysis is divided into two parts. First, we examine determinants of diversification in more than one hundred countries. Second, we restrict our analysis to resource-rich countries.

The results presented in Table 1 demonstrate that institutional and infrastructure-related factors are the most significant predictors of diversification worldwide. Specifically, government effectiveness and access to clean water have strong effects on economic

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[2] We performed regressions on the time series panel data using random effects generalized least squares method with robust standard errors. The Hausman test confirms the appropriateness of using random effects method in every model presented in the tables.

diversification.[3] This finding implies that the quality of government and better infrastructure are important factors that support the product diversification. The level of corruption and the regulatory quality of institutions measured by Kaufmann, Kraay and Mastruzzi (2009) are also related to economic diversification. All three institutional variables are highly correlated (see Appendix 3). Typically, well-functioning governments suffer less from corruption. In this regard, the diversification experience of Chile and Kazakhstan can be contrasted. While the government of Kazakhstan made significant efforts to diversify its economy from the extractive sector, there has been little progress in terms of economic or export diversification during the past decade, in part, due to weak institutions. In contrast, Chile has made great strides in diversifying its economy over the past two decades, and better functioning government institutions played a major role in this process.

In addition, the results consistently show that measures of economic activity affect economic diversification. Increases in government expenditure and foreign direct investments (FDI), along with a rise in the share of the economy devoted to government expenditure or consumption, contribute to a higher level of economic diversification. While GDP size is significantly related to economic diversification, GDP growth is not. As specified by economic theory (Imbs and Wacziarg 2003; Klinger and Lederman 2004), GDP size is a detractor from diversity. In other words, economies re-specialize when they grow beyond a certain point. It is also noteworthy that trade-related variables and education appear to be weakly related to economic diversification.

In general, factors that influence economic and export diversification greatly differ. For instance, measures of economic freedom such as trade and investment freedom are positively related to export diversification, while the same factors are not central to the economic diversification process. Another interesting result is that FDI has different impacts on the measures of economic and export diversification. Finally, one significant

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[3] A lower value of the Herfindahl-Hirschman Index represents a higher level of economic diversification. Thus, the negative relationship between institutional variables and the index indicates that institutional factors have a positive impact on economic diversification.

finding of this exercise is that an abundance of resources hurts export diversification. In contrast, the same variable plays no significant role in the economic diversification process.

Table 1. Determinants of Economic Diversification (All Countries)

	Value-add HHI (1)	Value-add HHI (2)	Value-add HHI (3)	Export HHI (1)	Export HHI (2)
Price Level	.01225	-.00445	-.00906	.11025***	.06863**
Investment Freedom	-.02282			-.13991**	-.174***
FDI Flows	.24678	-.02427**	-.01329*	-.0348	-.05687
GDP per Capita	6.17e-05	1.19e-04**			5.43e-05
Current GDP			6.36e-05**	-7.90e-05	
Access to Clean Water	-.1155**	-.1328***	-.1315***	-.35348	-.37991
Trade Freedom Index	-.02472	-.00214	7.53e-04	-.44481***	-.4178***
Trade Openness in Constant Terms	.01174	.00507			.08368*
Trade Openness in Current Terms			-.00135	.0797*	
Government Share of Real GDP p/c	-.20286***				
Consumption Share of Real GDP p/c	-.18296***	-.09045**			-.30606**
Consumption Share of Current GDP p/c			-.09188**	-.22563*	
Government Effectiveness	-2.28535**	-1.75869***	-1.07841*	1.7354	.91145
Resources as % of Exports	-.01707	-.0178	-.01606	.4556***	.4401***
Constant	44.2***	30.6***	31.8***	96.2***	100.03***
R² (Overall)	0.42	0.35	0.34	0.69	0.69
Observations	136	128	128	120	120

Note: *significant at the 1 percent level; **significant at the 5 percent level; and ***significant at the 10 percent level.

Next, this study analyzes determinants of diversification in resource-dependent countries. As shown in Table 2, GDP growth and resources as a percent of exports becomes significant. However, the effects of these variables differ for economic and export diversification. Resource dependence aids economic diversification and hurts export diversification efforts. The coefficient for GDP growth is positive, suggesting that fast-growing resource-rich economies are less likely to be diverse than slow-growing ones—although this does not manifest itself in the general sample. One possible explanation for this is that the faster-growing economies are doing so mostly because of increases in commodity prices, especially between 2003 and 2008. For instance, resource-dependent countries such as Azerbaijan, Kazakhstan and Russia grew at an average rate of about 10 percent per year during this period.

The results shown in Table 2 also indicate that trade-related variables, along with economic structure, affect export diversification. Trade and investment freedom have positive impacts on diversification.[4] Trade freedom facilitates the cross-border expansion of industries and export of goods. Investment freedom measures institutional support for investments. The higher volume of investment in multiple sectors, the more likely numerous sectors would contribute to exports in a substantial way. It must be noted, however, that institutional variables appear to have negligible effects on export diversification. Inflation also has no impact on export diversification in resource-dependent countries.

Trade openness seems to have no significant impact on export diversification when the sample includes only resource-rich countries. After the success of the East Asian countries, many resource-dependent countries adopted export-led strategies to diversify their export portfolios and opened up their economies for international trade. Our findings indicate that in countries with abundant natural resources, trade openness

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[4] Trade freedom measures an economy's openness to the import of goods and services from around the world, while investment freedom is used as a proxy for a free, open investment environment. Both indicators are taken from the Heritage Foundation's website.

played an insignificant role in promoting export sophistication. However, the trade freedom index supports export diversification as presented in the full sample. Unsurprisingly, the more a country depends on resources, the less likely it is to have a diverse export profile.

Table 2. Determinants of Economic Diversification in Resource-Rich Countries

	Value-add HHI (1)	Value-add HHI (2)	Export HHI (1)	Export HHI (2)
Price Level	-.00861	-.01394	.10228	.06231
Investment Freedom	-.03105		-.31416**	-.31156*
FDI Flows	-.15842	-.17223*	.15598	.07272
Growth of Real GDP Chain p/c		.33506**		
Growth Rate of Real GDP	.32324**			.10268
GDP per Capita	2.56e-04***	2.11e-04*		9.97e-05
Current GDP			-1.63e-04	
Access to Clean Water	-.181**	-.157**	-.1153	-.163
Trade Freedom Index	.05284	.03681	-.70689***	-.70114***
Trade Openness in Constant Terms		.00637		
Trade Openness in Current Terms			.05148	.03878
Secondary Education (Net % of Workforce)	.02401	.04578	-.25714	-.30088
Financial Freedom	.02318	8.56e-04	.07165	
Consumption Share of Real GDP p/c	-.17321***	-.11492*		-.37868
Investment Share of Real GDP p/c	-.04257			-.1658
Consumption Share of Current GDP p/c			-.49517**	
Investment Share of Current GDP p/c			-.50558**	
Government Effectiveness	-3.34***	-3.56***	6.85	4.74
Resources as % of Exports	-.082**	-.061*	.436***	.450***
Constant	39***	32.2***	13.5***	12.5***
R^2 (Overall)	0.4355	0.3869	0.7190	0.6857
Observations	55	55	52	52

Note: *Significant at the 1 percent level, **significant at the 5 percent level, and ***significant at the 10 percent level.

Conclusion

In this study we examined the determinants of diversification in a wide range of countries, especially those whose economies depend heavily on natural resources. The time trend analysis for advanced economies, emerging markets and resource-rich countries illustrated that the level of economic and export diversification is significantly lower in resource-rich countries, compared with advanced economies and emerging markets. Moreover, the study found that the composition of exports in resource-rich countries is not only poorly diversified but also is technologically less sophisticated than other countries in the sample. Over time, both the level of diversification and product sophistication in resource-rich countries have experienced little change and remained at the lower levels. In these countries, manufacturing value added accounts for about 11 percent of GDP, and the trend has been downward throughout the past couple of decades.

This analysis showed that infrastructure and the quality of institutions are important determinants of economic diversification. The country is in a better position to diversify its production base if it has a well-developed physical infrastructure and viable institutions. In contrast, infrastructure and the quality of institutions seem to be of little significance for export diversification. Instead, investment and trade freedom and the measure of resource dependence determine the level of export diversification. While these freedoms boost the level of export diversification, resource dependence slows down the process. Another important finding from this study is that FDI flows facilitate economic diversification, but have negligible effects on export diversification.

The empirical analysis restricted to resource-rich countries produced similar results. The quality of institutions and infrastructure are critical to the economic diversification process, while trade and investment freedom are important for export diversification. The results also illustrated that resource dependence adversely affects export diversification and helps economic diversification.

These findings have wide-ranging policy implications. First, government polices directed at improving government effectiveness and regulatory quality are essential for promoting economic diversification. Second, governments in resource-dependent countries can efficiently promote export diversification by fostering investment and trade freedom. Furthermore, governments in resource-rich countries need to take effective measures to offset the negative impact of large foreign exchange inflows on competitiveness. Effectively managing this is a major challenge for export diversification in resource-dependent countries. More broadly, governments need to grapple with the fact that policies aimed at the economic diversification may negatively affect the odds of export diversification.

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Appendix 1

Recent Literature

There are at least three factors that account for the resurgence of the diversification debate. First, the global economic downturn of 2008-09 clearly showed that countries that poorly diversified in terms of the production base and export basket experienced disproportionately large swings in their fundamental economic variables. In particular, resourcedependent countries have been hit hard by the global financial crisis despite their relatively conservative spending policies during the boom period. Second, during the last decade there have been significant advances in diversification literature that enrich the diversification debate drawing lessons from historical development experiences in different regions of the globe. Third, trade liberalization of the past decade did not bring growth and development to many poor countries, and most observers argued that developing countries' failure to diversify their economies hindered them from benefiting globalization.

Recent advances in economic literature on diversification have significantly affected the policy debate on diversification and influenced how policies are made. In an important empirical study, Imbs and Wacziarg (2003) demonstrate that as income increases, economies become more diversified, and this process continues until the level of per capita income reaches about $9,000. Afterward, countries start the specialization process, which is shaped by endowments and various development policies. There is a U-shaped relationship between per capita income and sectoral concentration of the production. The authors show that this pattern holds true within a country over time. This implies that most developing countries are actually in the diversification stage and specialization comes at a later stage of their development journey.

Klinger and Lederman (2004) extend this research to export diversification trends and arrive at the same conclusion: the relationship between the number of new export products and per capita income can be characterized by an inverted U-curve. These findings strongly support the view that industrialization and product diversification are integral parts of the economic development process. As developing countries advance to a higher stage of development, they move their economic structure in the direction of manufacturing. Another widely observed empirical fact is that growth accelerations are strongly associated with rapid growth in manufacturing. In designing development strategies, low-income countries should emphasize policies that enhance both economic and export diversification.

Export diversification is positively associated with economic growth (Hesse 2008). There are at least three channels through which export diversification can improve economic performance. First, if the export diversification process involves discovering new products or adding value to existing goods, then it leads to higher productivity through knowledge spillovers. Second, export diversification into new industries enhances growth by promoting output growth in other industries through backward and forward links. Third, export diversification reduces the volatility of export earnings, which in turn reduces macroeconomic uncertainty. Less volatility of export earnings and macroeconomic uncertainty supports the growth process.

Another strand of research put forward compelling evidence that the sophistication of the manufacturing matters for growth (see Hausman, Hwang, and Rodrik 2007; UN International Development Organization 2009). The main finding in this literature is that production and export of high-value goods tend to improve long-term growth rates. It appears that fast-growing low- and middle-income countries have been able to shift their industries and exports in the direction of more sophisticated products. The UN report also shows that industrialization leads to export diversification. Finally, the literature convincingly demonstrates that agglomeration is important for reaping the benefits of "the economies of size." It has been argued that competitive pressure and

close proximity between suppliers and purchasers increase productivity and enhance quality (see Porter 1990; Sonobe and Otsuka 2006). In conclusion, the existing literature and the current policy debate will guide this study and assist in identifying potential determinants of diversification.

A plethora of political, institutional and economic factors affect the level and rate of diversification in a country. In our empirical analysis, we use panel data methodologies to identify key determinants of the economic and export diversification. Literature suggests that physical, policy, macroeconomic and institutional variables influence the diversification process. In our regressions, we use investments, GDP level, inflation, real exchange rates, the budget deficit, trade openness and several measures of institutions as the explanatory variables. The statistical model is estimated for the period from 1996 to 2008. In our analysis, two dependent variables, namely, the Herfindahl-Hirschman Index of economic diversification and the Herfindahl-Hirschman Index of export diversification are used.

Appendix 2

Measuring Diversification

The reliable measurement of diversification is a challenging task because simple measures of production and export shares in developing countries tend to be affected by movements in commodity prices. In order to reduce the distorting impact of commodity price fluctuations on the diversification measures, we examine the long-run trends of diversification. In our analysis of the diversification trends, manufacturing, value added, as a percent of GDP will be used to measure economic diversification, while the export sophistication index and the Herfindahl-Hirschman Index of export diversification will be used as proxies for export diversification.

In the econometric estimations, economic diversification will be measured using the Herfindahl-Hirschman Index for the sectoral concentration of value-added. We will calculate two export diversification indices to measure the degree to which exports are concentrated: the Herfindahl-Hirschman Index of export diversification and the export concentration index. Explanatory variables include macroeconomic variables, trade and industrial policy variables, measures of human and physical capital, institutional variables, and measures that reflect market access. In regression analysis, both measures of diversification will be used as the dependent variable and regressed on a host of explanatory variables that proxy infrastructure, institutions and different government policies. The results will demonstrate which policies and institutions are more effective in spurring both the economic and export diversification.

Data Sources

Our data for quantitative analysis come from three sources. The first is the UN Commodity Trade Statistics Database (UNCTAD) that covers a large number of products

at the six-digit level. The second study is the World Bank database, and the third is the Heritage Foundation.

Variables

As we mentioned earlier, to model predictors of economic and export diversification, we created two Herfindahl-Hirschman indices and regressed on a number of independent variables rooted in theory and explored elsewhere in the literature on them.[5] There were 107 countries in the data set chosen for their relevance to the world economy and to hydrocarbon and mineral production, as well as data availability and reliability.

Dependent Variable

To measure predictors of economic diversification, we created Valueaddhhi. This HHI was calculated using one-digit historical UNIDO Industrial Statistics economic value-added data by industry. This data set had the following categories:

Table 1. Composition of Value-Added Data

 Agriculture, hunting, forestry and fishing (International Standard Industrial Classification or ISIC A-B)

 Mining, manufacturing and utilities (ISIC C-E)

 Manufacturing (ISIC D)

 Construction (ISIC F)

 Wholesale, retail trade, restaurants and hotels (ISIC G-H)

 Transport, storage and communication (ISIC I)

 Other activities (ISIC J-P)

$$\sum_{i=1}^{n}\left(\frac{v_{ic}}{t_c}\right)^2$$

when v_{ic} is the sector's value added, t is the total value added for a given country and year, and n is the number of sectors.

Initial efforts to perform analysis using an HHI calculation based on these data as-is produced misleading results because in knowledge-driven economies (i.e. advanced economies) categories J-P are very well represented. This meant that these economies appeared to be the least diversified because a large portion of economic activity was concentrated in the "Other activities" sector.

Therefore, we estimated a breakdown of categories J-P based on the distribution of the other activities in the ILO Labor Statistics Database's Table 2B (total employment by activity). We created a J-K group, a L-M group, and an N-P group designed to mimic the logic of the groupings used in Table 1:

Table 2. Additional Sectors

J Financial intermediation

K Real estate, renting and business activities

L Public administration and defense; compulsory Social Security

M Education

N Health and social work

O Other community, social and personal service activities

P Households with employed people

We also broke manufacturing (D) out of the mining, manufacturing and utilities group so that it was not counted twice. We used the ILO employment data to find out what percentage of the other activities (J-P) block each of the three groups owned in every country, and used that to weigh the other activities figure into three separate figures. We calculated the HHI based on nine industry groups: the six enumerated in Table 1 and the three weighted portions of other activities.

As a recommendation for future research, it would be interesting to see how the data would change if this index were created from three- or four-digit data, or even from one-digit data when ISIC classifications A through P or Q were fully enumerated.

To measure predictors of export diversification, we created Exporthhi—an HHI of COMTRADE exports figures in local currency at the two-digit level by the 2002 HS (Harmonized System) coding system.

We also experimented with using UNCTAD's Diversification Index and Concentration Index (as described in the UNCTAD Handbook of Stats 2009) as dependent variables. These were available for far fewer countries than the dependent variables we calculated, so we did not perform extensive regressions with them. However, as noted in the analysis below, plotting them over time results in generally similar conclusions.

Independent Variables

Independent variables are drawn from physical capital, investment, growth and income levels: industrial and trade policies; macroeconomic variables; institutional variables; and market access using mostly data from the World Bank database and the UN, along with some indices calculated by the Heritage Foundation.[6]

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[6] We used time averages to control for heteroscedasticity and other issues that might cause spurious results. The panel data were evaluated as averaged groups of 1995-1998, 1999-2001, 2002-2004 and 2005-2008.

Appendix 3. Correlation Matrix of Institutional Variables

	Corruption	Government Effectiveness	Regulatory Quality
Corruption	1.0000		
Government Effectiveness	.9678 (.0000)	1.0000	
Regulatory Quality	.8978 (.0000)	.9314 (.0000)	1.0000