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DOES MAINLAND CHINA'S COMPETITIVENESS IN EXPORTS BENEFIT FROM ITS LARGE DOMESTIC MARKET?

Key points

- In the international trade literature, there is an idea that a large domestic market for certain products can stimulate exports of those products due to economies of scale, the so-called "home-market effect". In this light, this paper empirically examines ways in which a country's share of global exports is related to the size of its domestic market, and then discusses the implications on Mainland China's competitiveness in exports.

- Using a cross-country panel dataset comprising more than 120 countries and 1,200 products over 18 years, we find that countries with larger domestic markets tend to acquire higher shares in global exports. This positive relationship is visible at both the aggregate and the detailed product levels. We also find that the positive relationship is stronger for more complex products, especially when the larger market size reflects a higher level of income per capita.

- As further evidence, sector-level data on the Mainland's domestic consumption also suggest a shift in domestic demand from basic to sophisticated products over time, as households have become richer since China's entry into the World Trade Organization (WTO). Meanwhile, the Mainland's share in global exports of sophisticated products tend to rise in tandem with their domestic consumption shares, which likely reflects higher productivity growth in those industries driven by economies of scale.

- Our findings provide an interesting implication that expanding domestic demand for more complex industries alongside income growth would transform the structure of the Mainland's export basket and raise its share in global exports. This explanation is different from the conventional view that the Mainland's

advantages in exports were mainly because of supply-side factors such as a large labour force and cheap labour costs.

- Accordingly, our study suggests that Mainland China will likely be able to maintain its role as a major export hub by sustaining competitiveness in more sophisticated products, as its domestic market for those products continues to expand along with its rising income level.

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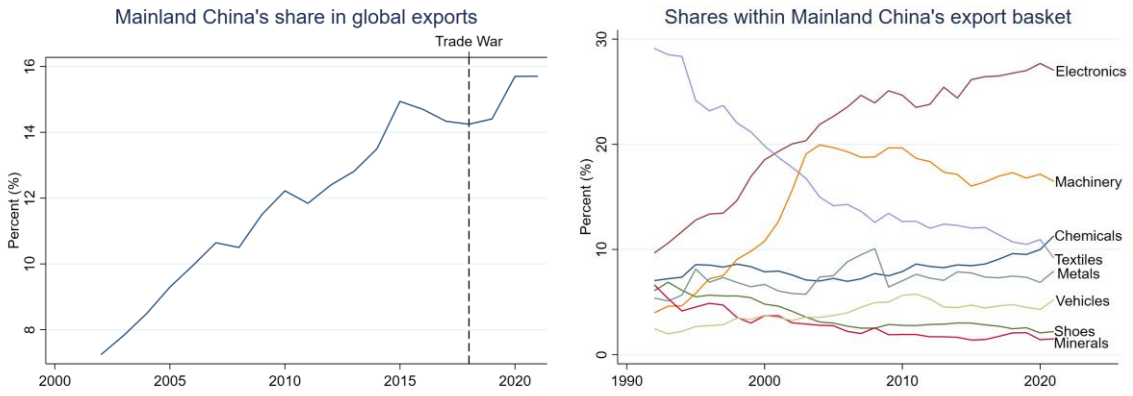
I. INTRODUCTION

Mainland China's ascent to a global export hub since joining the World Trade Organization (WTO)[1] has been manifested not only in its rising share of global trade but also in the structure of its export basket (Figure 1), within which there has been a constant shift from simple goods such as textiles and shoes to more sophisticated goods such as electronics and machineries. Meanwhile, the Mainland economy has also grown to become the world's second-largest economy, with the income per capita rising nearly fivefold when measured in purchasing power parity (PPP) terms.[2]

Figure 1: Rising global share and changing structure of Mainland China's exports



Notes: All shares are calculated in terms of value for each year.
Sources: Base Analytique du Commerce International (BACI) and HKMA staff calculations.

In the international trade literature,[3] there is an idea that a large domestic market for certain products can stimulate exports of those products due to economies of scale. Existing empirical research typically tests the validity of such "home-market effect" by studying how the pattern of bilateral trade flows varies with countries' market sizes and/or sector characteristics.

In this study, we first examine ways in which an economy's export competitiveness, measured by the economy's share of global exports at both the aggregate and product levels, is related to the size of its domestic market. We then

[1] China has been a member of the WTO since 11 December 2001.
[2] See, for example, data from the World Bank: World Bank Open Data: GDP per capita, PPP (current international $) - China
[3] The large literature on the home market effect dates back to the influential work of Linder (1961) and Krugman (1980), who hypothesised and formalised the idea that strong domestic demand for certain goods can stimulate exports of those goods. More recent studies, such as Fajgelbaum, Grossman, and Helpman (2011), Fieler (2011) and Matsuyama (2015), focus on how growth of income per capita can generate changes in patterns of trade and specialisation between countries under non-homothetic consumer preference.

discuss how Mainland China's export success over the past two decades can be connected with the cross-country evidence that we establish.

Our study has an interesting implication that the expanding domestic demand for more sophisticated goods alongside income growth may have transformed the structure of the Mainland's export basket and thus raised its share of global exports. This explanation of export competitiveness is different from the conventional view that the Mainland's export success has been mainly because of supply-side factors such as a large labour force and low labour costs.

More specifically, Mainland China seems to have followed the international experience that as a country gets richer, it tends to become more competitive in exports of sophisticated goods relative to simple ones. This may partly be driven by economies of scale in sophisticated industries, as the country's domestic market demand gradually tilts towards those industries. Accordingly, our findings suggest that the Mainland can maintain its export competitiveness going forward as long as its income level continues to rise, even though its manufacturing sector currently faces increasing uncertainties ranging from geopolitical tensions to the reshuffling of global supply chains.

II. WHAT DO CROSS-COUNTRY REGRESSIONS TELL US ABOUT THE HOME-MARKET EFFECT ON EXPORT COMPETITIVENESS?

In this section, we examine the empirical relationship between a country's export competitiveness and its domestic market size. We adopt a simple and intuitive measure of export competitiveness: a country's share of total global exports in a given year, which operates at both the aggregate and the product levels.[4] The size of a country's domestic market is measured by either the country's domestic absorption or the two key components of GDP, income per capita and population, all in real (purchasing power parity) terms.[5]

There are two sets of regression. The first set of regressions looks at how a country's aggregate export share ($Share_{c,t}$) co-varies with measures of its domestic market size ($Market\ Size_{c,t}$). We control for both country and year fixed

[4] Exports shares are constructed using the Base Analytique du Commerce International (BACI) dataset, which provides data on bilateral trade flows for over 200 countries and 5,000 products at the Harmonized System six-digit (HS6) level. The dataset has an annual frequency; we consider trade data from 2002, the year following Mainland China's accession to the WTO. The dataset improved the UN Comtrade database by resolving some inconsistencies in the trade values reported by importing and exporting countries. The dataset is available at: CEPII BACI

[5] Data on market size-related variables are sourced from Penn World Table (PWT) version 10.0.

effects, which capture time-invariant unobserved country characteristics and time-varying shocks that were common to all countries. The baseline regression model is specified as follows:

$$Share_{c,t} = \alpha + \beta_1 \, Market\ Size_{c,t} + \beta_2 \, IC_{c,t} + \delta_c + \lambda_t + \varepsilon_{c,t} \qquad (1)$$

Table 1: Export performance and domestic market: country-level evidence

	(1)	(2)	(3)	(4)	(5)	(6)
	Share	Share	Share	Share	Share	Share
Market Size	0.326***		0.332***	0.316***		
	(0.031)		(0.033)	(0.031)		
Income		0.330***			0.337***	0.331***
		(0.031)			(0.031)	(0.031)
Population		0.378***			0.399***	0.360***
		(0.080)			(0.082)	(0.079)
# Products			-0.028		-0.040	
			(0.037)		(0.038)	
ECI				0.204***		0.217***
				(0.032)		(0.032)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.97	0.97	0.97	0.97	0.97	0.97
Observations	2214	2214	2214	2214	2214	2214

Note: Sample period is 2002 to 2019. Shares are in % terms. ECI ranges from -3 to 3. All other variables are in log terms. Standard errors in parentheses.
* p<0.10, ** p<0.05, *** p<0.01

Table 1 reports the regression results of equation (1) using a panel dataset comprising 123 countries during 2002 to 2019.[6] Not surprisingly, countries with greater domestic expenditure, larger population size and higher income per capita tend to acquire a higher share in global exports. Coefficients in columns (1) and (2) suggest that a 100% increase in any of these three variables is associated with

[6] Countries with population of less than 1 million or an average annual trade volume of less than US$1 billion, or countries that do not exist in any of our three main data sources are not included in our sample.

an increase of 0.3-0.4 percentage points in a country's share of global exports.

To enrich our baseline regression model, we introduce an additional supply-side control variable that gauges a country's time-varying industrial capability ($IC_{c,t}$). The following two alternative measures of industrial capability are adopted: (1) the number of distinct HS-6 products (# Products) a country exports in a given year which is calculated directly from the BACI trade data; and (2) the Economic Complexity Index (ECI) provided by the Atlas of Economic Complexity (AEC) database built by the Growth Lab at the Harvard Kennedy School,[7] which takes into account not only the number of distinct products (i.e. diversity) in a country's export basket but also the level of complexity of those products. The results suggest that the variety of products alone does not matters for a country's share in global exports (columns (3) and (5)). However, having a diversified export basket concentrated in more complex products can increase a country's share in global exports (columns (4) and (6)).

The second set of regressions delves into how a country's export competitiveness in a specific product is related to its domestic market size and how this correlation varies across products with respect to the level of product complexity. To explore these questions, we add an interaction term between market size and product complexity into equation (1) while controlling for both variables:

$$Share_{c,p,t} = \alpha + \beta_1 \, Market\ Size_{c,t} + \beta_2 \, PCI_{p,t} + \beta_3 \, Market\ Size_{c,t} \times PCI_{p,t} + \delta_c + \xi_p + \lambda_t + \varepsilon_{c,p,t} \quad (2)$$

A country's export competitiveness in a HS 4-digit product is measured by its share in global exports of that product in a given year ($Share_{c,p,t}$).[8] The Product Complexity Index ($PCI_{p,t}$) captures the sophistication of know-how required to produce each HS-4 product, which is taken directly from the AEC database. Product fixed effects are also added to control for unobserved product characteristics that might affect the outcome variable.

[7] The index is calculated based on how many other countries can produce the product and the overall economic complexity of those countries. The database and ranking methodology is available at: Country & Product Complexity Rankings. See also Hausmann et al. (2014) for a detailed description.
[8] There are a total of 1,234 products at the HS 4-digit level in our sample.

Table 2: Export performance and domestic market: product-level evidence

	(1)	(2)	(3)	(4)
	Share	Share	Share	Share
Market Size	0.333***		0.334***	
	(0.011)		(0.011)	
Income		0.332***		0.334***
		(0.011)		(0.011)
Population		0.249***		0.260***
		(0.027)		(0.027)
PCI	0.045***	0.045***	-1.092***	-2.117***
	(0.008)	(0.008)	(0.018)	(0.022)
Market Size x PCI			0.091***	
			(0.001)	
Income x PCI				0.216***
				(0.002)
Population x PCI				0.032***
				(0.001)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
R-squared	0.31	0.31	0.31	0.32
Observations	2186727	2186727	2186727	2186727

Note: Sample period is 2002 to 2019. Shares are in % terms. PCI ranges from -3 to 3. All other variables are in log terms. Standard errors in parentheses.
* $p<0.10$, ** $p<0.05$, *** $p<0.01$

Results of the product-level regressions are presented in Table 2. Similar to the previous finding, export shares for an average product are also positively correlated to countries' market sizes across all specifications. In particular, the coefficients on the interaction term between domestic absorption and PCI is positive (column (3)), implying that the impact of market size on export share is greater for products with a higher PCI, i.e. more sophisticated goods. Moreover, the last two coefficients in column (4) suggest that it is mainly the income component of

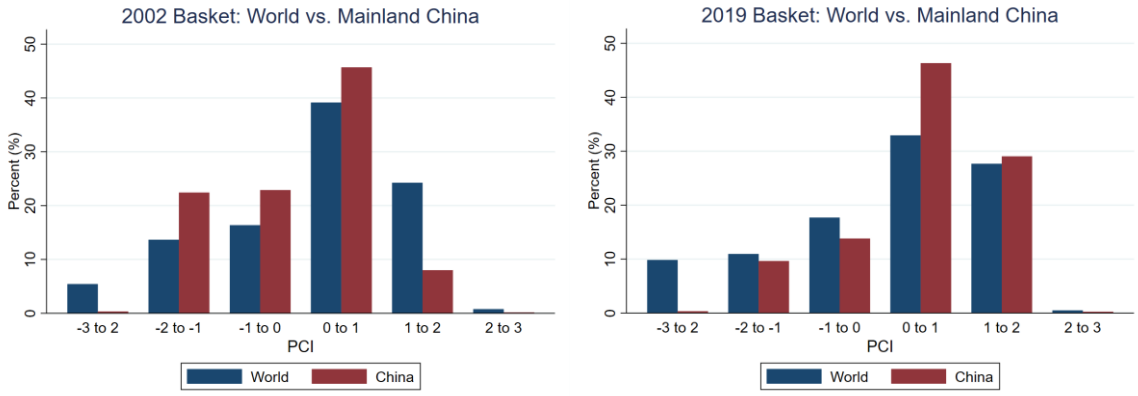
the market size that drives the relationship, though population also plays a positive, albeit much smaller, role. In other words, it is higher income per capita, rather than bigger population size, that dictates the export shares of more complex products.

As a robustness check for both equations (1) and (2), we include an additional set of time-varying control variables collected from the World Bank that measures a country's macroeconomic quality (e.g. infrastructure quality). In these alternative specifications, the positive relationship between export shares and various measures of market size still holds. The results are reported in the Appendix.

III. How does Mainland China fit in the international experience?

One important takeaway from the cross-country evidence is that the overall complexity of a country's export basket (as measured by the ECI) is a strong predictor of its overall export competitiveness while the number of product categories exported is not. To illustrate this point, in Figure 2 we divide export baskets of the world and Mainland China separately into six bins by the order of product complexity (as measured by the PCI) and compare their distribution of value shares in 2002 and 2019. In both years, the more sophisticated products (with PCI > 0) make up a larger share of global trade in terms of value, implying that all else being equal, countries that specialise in exporting higher PCI products can increase their shares of the pie in global trade. Relative to the world distribution, Mainland China's export basket has clearly restructured towards the higher complexity segments (i.e. a PCI ranging from 1 to 2) over this period, which contributes to the increase in its global export share through raising its share in higher-valued products.

Figure 2: Distribution of products by PCI in Mainland China and world export basket: 2002 versus 2019

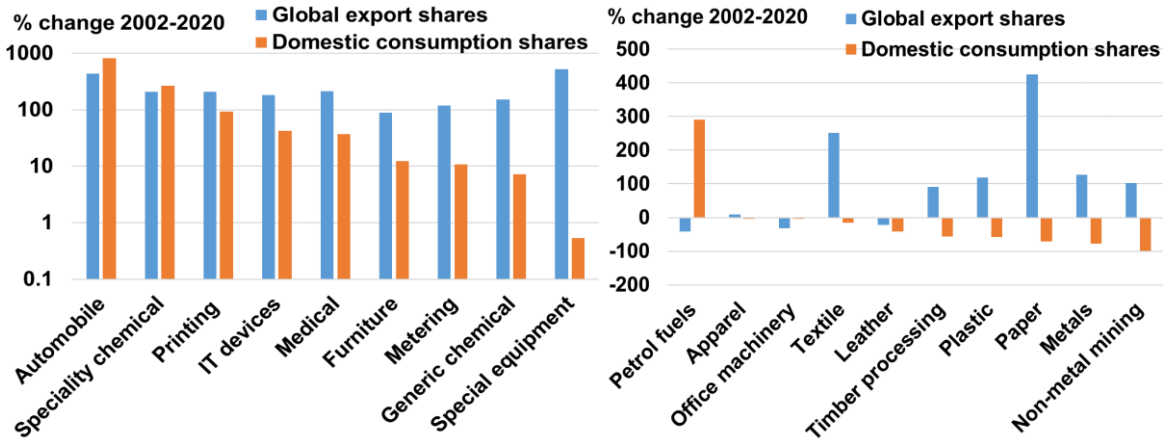


Note: Shares are calculated in terms of value.
Sources: BACI, AEC and HKMA staff estimates.

A major empirical challenge facing our cross-country analysis is that a country's measured market size may depend on not just its domestic demand conditions, but also the supply-side factors such as the size of the labour force and productivity. Therefore, it is arguable that the positive link between the export performance and market sizes cannot be simply interpreted as a home-market effect. However, exogenous shifters that can be used to distinguish demand- and supply-side drivers of home market sizes are rarely observable in practice, especially at the country level.[9]

To investigate the potential role that the domestic market forces may have played in shaping the Mainland's export patterns, we delve further into industry-level data on domestic consumption expenditure sourced from the National Bureau of Statistics (NBS) input-output tables and match the industry classification to our trade data using a concordance provided by Brandt et al. (2017).

Figure 3: Long-run changes in domestic consumption shares and global export shares: "sophisticated" (left-hand side) vs "basic" industries (right-hand side)



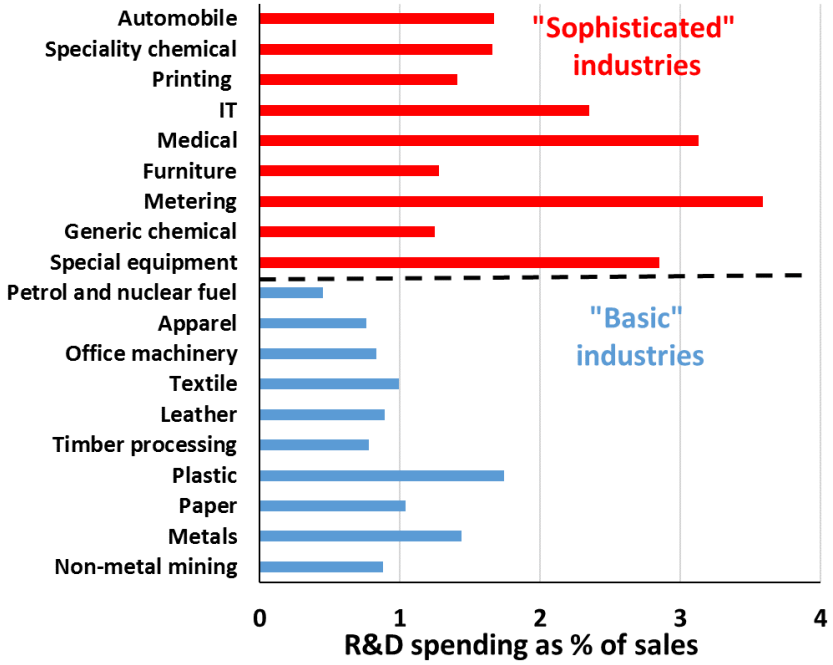
Note: The blue bars represent % changes in Mainland China's shares of global exports for each industry. The orange bars represent % changes in Mainland China's domestic consumption shares for each industry.
Sources: NBS, BACI and HKMA staff estimates.

In Figure 3, we plot for each industry the change in domestic consumption shares against the change in global export shares over the period of 2012 to 2020. First, domestic expenditure shares of "sophisticated" industries (e.g.

[9] Recent studies have attempted to construct exogenous demand shifters to identify the causal impact of local demand on exports. For example, Costinot et al. (2019) develop a simple test of the home market effect using detailed drug sales data from the global pharmaceutical industry based on cross-country variation in demographic characteristics.

automobiles, speciality chemicals and IT devices) tend to rise over time, while those of more "basic" industries (e.g. shoes and clothing) tend to see declines. Second, for the sophisticated industries, their growth in export shares is often accompanied by expansions in domestic expenditure shares, while there is no obvious correlation between the two among basic industries.

Figure 4: Research & development (R&D) spending in "sophisticated" vs "basic" industries



Source: NBS.

What we find in Mainland China's case echoes a well-documented fact in trade and economic development literature that the income elasticity of demand varies across goods, i.e. consumer preference is non-homothetic. The post-WTO era has been a period of remarkable economic growth for Mainland China, during which the income per capita has increased drastically. In this regard, the shift in expenditure from basic to sophisticated industries observed in Mainland China may have been a natural consequence of its rising income level, which shifts consumers' preference in favour of the latter categories. This change in demand structure may have in turn induced a home-market effect on exports: the fast-expanding domestic markets for sophisticated goods attract more competition and R&D investments (Figure 4) into those sectors, leading to higher productivity growth and lower costs of production, which ultimately translates into greater competitiveness in the exports of those goods. In comparison, exports of basic goods sectors would rely more on external demand, as their domestic markets shrink on a relative basis, resulting in a lower correlation

between exports and domestic expenditure.

To sum up, while our analysis in this section is only suggestive rather than conclusive, the influence of a substantial increase in the income level on the structure of domestic demand may be a secular and fundamental force that cannot be ignored.

IV. CONCLUSION

The US-China trade war marks a turning point in the globalisation era. Against the backdrop of a more uncertain external environment, some economists believe that in order for Mainland China to maintain its competitiveness in exports, it should rely on the sheer size of its domestic market (associated with its large population) to achieve economies of scale. Indeed, our cross-country analysis indicates a positive correlation between a country's share of global exports and its home market size, which can be attributed to both the size of population and the level of income.

However, once we look beneath the aggregate level, our results suggest that the growth in the income level may have played a more important role in explaining Mainland China's success in exports, especially of more sophisticated goods, over the past two decades. In particular, the substantial increase in the income level of Mainland China has shifted its domestic demand towards more sophisticated goods, which in turn leads to higher productivity growth in those industries and hence greater competitiveness in exports. In this sense, the Mainland will likely be able to maintain its role as an export hub by sustaining its export competitiveness in more sophisticated products as its domestic market for those products continues to expand along with its rising income level.

REFERENCES

Brandt, L., Van Biesebroeck, J., Wang, L., & Zhang, Y. (2017). WTO accession and performance of Chinese manufacturing firms. *American Economic Review*, 107(9), 2784-2820.

Costinot, A., Donaldson, D., Kyle, M., & Williams, H. (2019). The more we die, the more we sell? A simple test of the home-market effect. *The Quarterly Journal of Economics*, 134(2), 843-894.

Fajgelbaum, P., Grossman, G. M., & Helpman, E. (2011). Income distribution, product quality, and international trade. *Journal of Political Economy*, 119(4), 721-765.

Feenstra R.C., Inklaar R., Timmer M.P. (2015). The Next Generation of the Penn World Table. *American Economic Review*, 105(10), 3150-3182.

Fieler, A. C. (2011). Nonhomotheticity and bilateral trade: Evidence and a quantitative explanation. *Econometrica*, 79(4), 1069-1101.

Gaulier, G. and Zignago, S. (2010). BACI: International Trade Database at the Product-Level. The 1994-2007 Version. *CEPII Working Paper*, No. 2010-23.

Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., & Simoes, A. (2014). *The Atlas of Economic Complexity: Mapping Paths to Prosperity*. Cambridge: MIT Press.

Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. *The American Economic Review*, 70(5), 950-959.

Linder, S. B. (1961). *An Essay on Trade and Transformation*. Stockholm: Almqvist & Wiksell. pp. 82-109.

Matsuyama, K. (2015). The Home Market Effect and Patterns of Trade Between Rich and Poor Countries. The London School of Economics and Political Science. *Centre for Macroeconomics Discussion Paper Series*, No. 1519.

Appendix: Robustness check with additional control variables

Table A1: Export performance and domestic market size

	(1)	(2)
	Share	Share
Market Size	0.170***	
	(0.040)	
Income		0.222***
		(0.039)
Population		0.293**
		(0.125)
Infrastructure	0.058**	0.050*
	(0.026)	(0.026)
Macro Stability	0.040***	0.032**
	(0.013)	(0.013)
Education	0.015	0.025
	(0.038)	(0.038)
Health	0.007	0.002
	(0.036)	(0.036)
Year FE	Yes	Yes
Country FE	Yes	Yes
R-squared	0.99	0.99
Observations	1240	1240

Notes: Sample period is 2007 to 2017. Shares are in % terms. Indices on infrastructure, macro stability, education and public health range from 1-7. All other variables are in log terms. Standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table A2: Export performance at the product level: robustness check

	(1)	(2)	(3)	(4)
	Share	Share	Share	Share
Market Size	0.162***		0.163***	
	(0.021)		(0.021)	
Income		0.143***		0.140***
		(0.021)		(0.021)
Population		0.291***		0.292***
		(0.064)		(0.064)
PCI	0.085***	0.085***	-1.131***	-2.230***
	(0.012)	(0.012)	(0.025)	(0.031)
Market Size x PCI			0.096***	
			(0.002)	
Income x PCI				0.226***
				(0.003)
Population x PCI				0.043***
				(0.002)
Infrastructure	0.092***	0.092***	0.092***	0.091***
	(0.013)	(0.013)	(0.013)	(0.013)
Macro Stability	0.016**	0.016**	0.015**	0.017**
	(0.007)	(0.007)	(0.007)	(0.007)
Education	0.022	0.024	0.022	0.024
	(0.019)	(0.020)	(0.019)	(0.019)
Health	0.018	0.019	0.017	0.019
	(0.019)	(0.019)	(0.019)	(0.019)
Year FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes
R-squared	0.32	0.32	0.32	0.32
Observations	1279679	1279679	1279679	1279679

Note: Sample period is 2007 to 2017. Shares are in % terms. PCI ranges from -3 to 3. Indices on infrastructure, macro stability, education and public health range from 1-7. All other variables are in log terms. Standard errors in parentheses. * $p<0.10$, ** $p<0.05$, *** $p<0.01$