Virtual water and the inequality in water content of consumption

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ONLINE APPENDIX

Appendix A. Numerical example and proof of Proposition 1

Numerical Example

To illustrate this result and derive empirical implications, consider a numerical example in which home and foreign are endowed with the following amounts of the two composite production factors in per capita terms[1]:

$$V = \begin{bmatrix} R = & 1500 \\ C = & 500 \end{bmatrix} \qquad V^* = \begin{bmatrix} R^* = & 1500 \\ C^* = & 5500 \end{bmatrix}.$$

Assuming that $r = 5$ and $c = 10$ implies that $s = 0.2\%$ and $s^* = 0.8\%$, and we obtain the following values for the per capita factor content of consumption of each country:

$$s(V^g) = \begin{bmatrix} R = & 600 \\ C = & 1200 \end{bmatrix} \qquad s^*(V^g) = \begin{bmatrix} R^* = & 2400 \\ C^* = & 4800 \end{bmatrix}.$$

In this situation, both countries consume a per capita bundle of goods that contains a 1-to-2 proportion of factors, and thus, trade leads to a more even distribution of factors within countries. Now, consider the net exports of natural resources and capital per capita in each country:

$$nx^R = 1500 - 600 = 900 \text{ and } nx^{R^*} * = 1500 - 2400 = -900,$$

$$nx^C = 500 - 1200 = -700 \text{ and } nx^C * = 5500 - 4800 = 700.$$

Notice that home is a net exporter of natural resources (and importer of capital), since home has a relative abundance of natural resources with respect to foreign (i.e., $R/C > R^*/C^*$). Indeed, home has a comparative advantage in producing agricultural goods and specializes in the production of these goods for export purposes in order to increase its consumption of capital-intensive goods. However, if those countries that have a comparative advantage in producing and exporting agricultural goods are not richer in water, with respect to those that have a comparative advantage in producing industrial goods, implying that $W \leq$

[1] Notice that in the example we implicitly make the assumption that $(W^*/W)R > R^*$. As shown in appendix A, when $(W^*/W)R \leq R^*$, the conditions on capital endowments that satisfy proposition 1 are weaker, since they only require that C be lower than a given threshold that is strictly positive for any non-negative value of C^*.

W^*, trade has the potential to increase unevenness in the per capita water distribution. In order for this to be the case, it must be that countries that typically export agricultural products are also scarce in capital.

To see this, continuing with the example above and assuming that water and land are perfect complements (i.e., $R = min[W, L]$) to simplify exposition (and without loss of generality), we now set $W = 1500$, $L = 1500$ and $W^* = 2000$, $L^* = 1500$. Using the expressions for the per capita water content of consumption for home and foreign, which are respectively given by $s(W^g)$ and $(1 - s)(W^g)$, it is immediate to obtain the following result:

$$s(W^g) = 700 < W,$$

$$(1 - s)(W^g) = 2800 > W^*.$$

Thus, countries that are already scarce in water will tend to reduce their consumption of goods that incorporate water. This occurs because although home is relatively abundant in natural resources (land and water) with respect to foreign, it does not have more water than foreign, but is instead poor in capital. This is amplified by having assumed a relatively low price of natural resources with respect to the price of capital. The combination of these effects is what determines the home's modest share of world income, leading to a decrease in the water content of consumption.

Proof of Proposition 1

Based on the standard results of the Heckscher-Ohlin (HO) model, we know that a country will export the product that requires a greater intensity of the factor of which it is more abundant. Without loss of generality, we assume that home is relatively abundant in natural resources ($R/C > R^*/C^*$).

Now we show the sufficient conditions for trade to lead to less even per capita consumption of water resources across countries. First notice that the condition for the per capita factor content of consumption to be less than the per capita endowment of water is:

$$s\,(W^g) \ < \ W, \tag{A1}$$

where $W^g \ = \ W \ + \ W^*$ is the global endowment of water. When (A1) is satisfied, if $W \ \leq \ W^*$, it is straightforward to see that trade can never lead to a more even per capita consumption of water. Considering that $s^* \ \equiv \ (1 \ - \ s)$, then (A1) simplifies to:

$$\frac{s}{s^*} < \frac{W}{W^*}$$

Now considering that $s/s^* \ = (Y/Y^g) \ / \ (Y^*/Y^g) \ = \ Y/Y^*$, the above expression can be rewritten in the following way:

$$\frac{r(R)+c(C)}{r(R^*)+c(C^*)} < \frac{W}{W^*}\,.$$

Rearranging terms, we can obtain a condition on the maximum level of capital of home that guarantees that the above inequality is satisfied:

$$C < C^*\frac{W}{W^*} - \frac{r}{c}\left(\frac{W^*R - WR^*}{W^*}\right) \equiv \underline{C}\,. \qquad \text{(A2) (QED)}$$

Appendix B. Description of variables and additional summary statistics

Table A1 contains a brief description of the variables used in our analysis. Additional details can be found in Debaere (2014).

Table A1. Variables description

Variable	Description	Primary source
NX	Natural logarithm of net export in USD. When net export was negative, we used *NX* = −*ln*(*net import*).	Feenstra, Lipsey, and Bowen (1997)
W	Natural logarithm of country's available renewable fresh water per capita (km^3/*million people*)	Gleick et al. (2009)
L	Natural logarithm of arable land in hectares per capita in 1997.	World Bank
K	Natural logarithm of average capital stock per worker in 1992.	Antweiler and Trefler (2002)
H	Natural logarithm of the ratio of workers completing high school to those not completing high school in 1992.	Antweiler and Trefler (2002)
w_b^d	Relative ranking of US blue water intensities (direct).	Blackhurst, Hendrickson, and Vidal (2010)
w_b^{di}	Relative ranking of US blue water intensities (direct and indirect).	Blackhurst, Hendrickson, and Vidal (2010)
w_{gb}^d	Relative ranking of US green and blue water intensities (direct).	Blackhurst, Hendrickson, and Vidal (2010)
w_{gb}^{di}	Relative ranking of US green and blue water intensities (direct and indirect).	Blackhurst, Hendrickson, and Vidal (2010)
l	Ratio of land use to total factor use for a sector.	Global Trade Analysis Project (GTAP)
k	Physical capital intensities.	Bartlesman and Gray (1996)
h	Human capital intensities.	Bartlesman and Gray (1996)

Notes: Sector codes have been converted from the original 4-digit SITC codes to the BEA 1997 IO industry classification. GTAP codes have been matched first with the 6-digit HS categories and then with the BEA 1997 IO.

Table A2 reports for each country the number of sectors included in the sample.

Table A2. Sample composition

Country	Frequency	Proportion	Country	Frequency	Proportion
Argentina	172	1.54	Madagascar	142	1.27
Australia	173	1.55	Malawi	133	1.19
Austria	171	1.53	Malaysia	171	1.53
Bangladesh	161	1.44	Malta	158	1.41
Barbados	141	1.26	Mauritius	156	1.39
Bolivia	158	1.41	Mexico	172	1.54
Brazil	174	1.56	Morocco	168	1.5
Cameroon	153	1.37	Netherlands	172	1.54
Canada	172	1.54	New Zealand	172	1.54
Chile	170	1.52	Nigeria	165	1.47
Colombia	169	1.51	Norway	171	1.53
Costa Rica	162	1.45	Pakistan	164	1.47
Denmark	171	1.53	Panama	162	1.45
Ecuador	165	1.47	Papua N.Guin	146	1.31
Egypt	169	1.51	Peru	171	1.53
El Salvador	157	1.4	Philippines	172	1.54
Ethiopia	144	1.29	Portugal	172	1.54
Fiji	149	1.33	Singapore	170	1.52
Finland	172	1.54	South Africa	172	1.54
France	172	1.54	Spain	172	1.54
Germany	174	1.56	Sri Lanka	160	1.43
Ghana	162	1.45	Suriname	131	1.17
Greece	173	1.55	Sweden	174	1.56
Guatemala	163	1.46	Syria	155	1.39
Honduras	159	1.42	Tanzania	145	1.3
Iceland	159	1.42	Thailand	171	1.53
India	171	1.53	Tunisia	168	1.5
Indonesia	173	1.55	Turkey	173	1.55
Ireland	173	1.55	UK	172	1.54
Israel	168	1.5	USA	173	1.55
Italy	173	1.55	Uruguay	166	1.48
Jamaica	164	1.47	Venezuela	169	1.51
Japan	172	1.54	Zambia	150	1.34
Korea Rep.	172	1.54	Zimbabwe	168	1.5

Note: This table shows the composition of our sample in terms of number of sectors and relative frequency by count.

Table A3 provides the pairwise correlation coefficients for our initial variables. As shown in this table, the endowments of physical and human capital present a very high correlation coefficient. Similarly, land and water intensity exhibit a rather high degree of correlation. For the sake of synthesis, we only report the correlation with our main water-intensity measure (i.e., the direct blue water intensity). However, results remain practically unchanged for all measures of water intensity.

Table A3. Correlation matrix (N=11,187)

	NX	W	L	K	H	w_b^d	l	k	h
NX	1								
W	-0.039***	1							
L	0.064***	**0.291*** **	1						
K	0.287***	0.138***	-0.041***	1					
H	0.230***	0.228***	0.054***	**0.832*** **	1				
w_b^d	0.094***	-0.002	0.004	0.004	0.002	1			
l	0.161***	-0.001	0.004	0.006	0.004	**0.688*** **	1		
k	-0.053***	-0.003	-0.001	0.008	0.009	-0.254***	-0.226***	1	
h	-0.119***	0.002	-0.003	-0.004	-0.002	**-0.408*** **	**-0.432*** **	-0.023**	1

Notes: Pairwise correlation coefficients. Significance: *p<0.1, **p<0.05, ***p<0.01.

The description of the principal components as well as the dependent variables capturing water-land trade flows are reported in table A4.

Table A4. Descriptive statistics for principal components and generated dependent variables

Variable	Description	Mean	SD	Min	p25	p50	p75	Max
R	Component of water and land endowment	0	1.136	-5.349	-0.506	0.071	0.767	2.406
C	Component of physical and human capital endowment	0	1.353	-3.658	-0.861	0.207	0.954	2.376
ρ_b^d	Component of water and land intensities (using direct blue water)	0	1.299	-0.457	-0.457	-0.457	-0.446	6.692
ρ_b^{di}	Component of water and land intensities (using direct and indirect blue water)	0	1.307	-0.456	-0.456	-0.456	-0.447	6.444
ρ_{gb}^d	Component of water and land intensities (using direct green and blue water)	0	1.279	-0.520	-0.498	-0.466	-0.260	8.166
ρ_{gb}^{di}	Component of water and land intensities (using direct and indirect blue and green water)	0	1.328	-0.505	-0.502	-0.494	-0.446	5.972

Note: This table describes our generated variables and shows their means, standard deviations, minimum values, three percentiles (25^{th}, 50^{th} and 75^{th}) and maximum values.

Appendix C. T-test for exporters and importers of natural resources

Table A5 presents the t-test statistics comparing countries that are net importers in sectors using natural resources more intensively with net exporters in the same sectors. The first two columns report the average endowments of water, capital, and natural resources in each subsample, whereas the third column provides the p-values of the differences in the means.

As mentioned in the main text, exporters significantly differ from importers of natural resources only in terms of (physical and human) capital. More precisely, the former countries are characterized by a lower endowment of composite capital.

Table A5. T-test Statistics for country groups

	Exporters in r_{max}	**Importers in r_{max}**	**p-value**
Capital	-0.834	0.250	0.002
Water (log)	1.701	2.207	0.147
Natural resources	-0.098	0.036	0.333

Appendix D. Robustness checks and endogeneity

This appendix reports a set of additional analyses addressing those issues potentially affecting our conclusions. First of all, we relax the assumption that regression coefficients are the same for exports and imports. In particular, we re-estimate our main model considering exports and imports, separately. This exercise serves to check the consistency of our results and determine whether they depend more on exports or imports. Second, the endowment of water is by definition a stock measure, but countries may also use the water from precipitation as a factor of production, which is a flow variable. Therefore, following Debaere (2014), we replace the endowment of blue and green water with precipitation data. New results are consistent with the estimates provided in table 2. Moreover, since factor intensities are derived from US technologies, we cannot exclude that, especially for agricultural sectors, the different availability of water affects the variety of goods produced and exported by each country. Therefore, following Debaere (2014), we use data from Mekonnen and Hoekstra (2011) on the countries' intensity of green and blue water employed in agriculture to control for technological heterogeneity across countries and the fact that developed countries tend to use water-saving technologies. Third, we re-estimate our model considering all factor endowments separately and checking if the use of a single intensity measure (ρ) provides reliable and easily interpretable results. Finally, we use an instrumental variable (IV) approach to address potential biases associated with endogenous inputs.

Exports and Imports

In table A6, we estimate equation (1) by splitting the dependent variable into exports (panel A) and imports (panel B). The structure of the table is the same as that of table 1, where column 1 accounts only for direct blue water intensity, column 2 considers both direct and indirect blue water intensity, whereas, in columns 3 and 4, we re-estimate the models of columns 1 and 2 also considering green-water intensities. Results reported in table A6 are consistent with those presented in table 1. In particular, according to the estimates in panel A, the coefficient of *C* decreases when ρ increases, and therefore exports of natural-resource-intensive goods are less sensitive to capital variations than exports of capital-intensive goods. In other words, when the endowments of physical and human capital grow, exports become less intensive in water and land. In contrast, the elasticity of imports with respect to capital inputs does not change with ρ (see panel B).

These two effects together explain why capital-abundant countries tend to import water-land-intensive goods and this tendency is only weakly contrasted by the availability of these natural resources. Indeed, exports in water-land-intensive sectors seem to be more sensitive to capital endowments than water-land endowments. By looking at the R^2-statistic, we may notice that models in table A6 fit the data better than models in table 1. However, these statistics do not take into account that a data point (i.e., a country-sector observation) may be pretty close to the regression line in case of exports and pretty far in case of imports, and this will generate a rather inaccurate estimate of the trade balance. In contrast, the estimates reported in table 1 minimize the squared errors considering both export and import performance at the same time. This makes our conclusions in terms of virtual water trade more consistent than those generated by table A6, although they are qualitatively the same.

Table A6. Exports and imports (N=11,174)

	(1)	(2)	(3)	(4)
Panel A. Total exports				
R	-0.287***	-0.287***	-0.287***	-0.287***
	(0.031)	(0.031)	(0.031)	(0.031)
$R \cdot \rho$	0.125***	0.131***	0.120***	0.123***
	(0.031)	(0.031)	(0.032)	(0.031)
C	1.983***	1.982***	1.983***	1.983***
	(0.040)	(0.040)	(0.040)	(0.039)
$C \cdot \rho$	-0.303***	-0.312***	-0.302***	-0.315***
	(0.056)	(0.054)	(0.054)	(0.048)
Sector dummies	Yes	Yes	Yes	Yes
F-statistic	750.651	781.901	748.938	795.750
RMSE	3.823	3.820	3.823	3.818
R^2	0.404	0.405	0.404	0.405
Panel B. Total imports				
R	-0.226***	-0.226***	-0.226***	-0.226***
	(0.016)	(0.016)	(0.016)	(0.016)
$R \cdot \rho$	-0.043***	-0.046***	-0.043***	-0.047***
	(0.013)	(0.013)	(0.012)	(0.012)
C	1.235***	1.235***	1.235***	1.235***
	(0.027)	(0.027)	(0.027)	(0.026)
$C \cdot \rho$	0.051	0.052	0.051	0.056*
	(0.033)	(0.032)	(0.032)	(0.030)
Sector dummies	Yes	Yes	Yes	Yes
F-statistic	615.998	625.395	614.800	625.685
RMSE	2.208	2.208	2.208	2.208
R^2	0.475	0.475	0.475	0.475

Notes: This table presents the estimates of equation (1), where the dependent variables are exports (panel A) and imports (panel B). In column 1, we interact the water-land endowment with a water-land intensity based on direct blue water intensity. Column 2 uses a water-land intensity component based on both direct and indirect blue water. In columns 3 and 4, we re-estimate the models of columns 1 and 2 also considering green water intensities. All estimates include a full set of sector dummies. We dropped 13 singleton observations. Clustered standard errors are in parentheses. Significance: *p<0.1, **p<0.005, ***p<0.01.

Alternative Measures of Water Endowment and Intensity

Additional robustness checks are provided in table A7. In column 1, we replaced the water endowment in the treelet algorithm with the logarithm of annual precipitations (per capita). In column 2 of table A7, ρ is the result of the treelet algorithm in which water intensity takes into account Mekonnen and Hoekstra's data. Finally, in column 3 we consider both measures at the same time.

Table A7. Net exports (N=11,174)

	(1)	(2)	(3)
R	-0.454***	-0.061*	-0.454***
	(0.024)	(0.036)	(0.024)
$R \cdot \rho$	0.071**	0.177***	0.069**
	(0.027)	(0.035)	(0.028)
C	0.805***	0.747***	0.804***
	(0.056)	(0.055)	(0.055)
$C \cdot \rho$	-0.346***	-0.364***	-0.355***
	(0.088)	(0.082)	(0.084)
Sector dummies	Yes	Yes	Yes
Hausman (p-value)	0.949	0.923	0.930
F-statistic	131.814	85.154	136.674
RMSE	3.229	3.334	3.225
R^2	0.279	0.231	0.281

Note: This table contains the robustness checks for our estimates. In column 1, we replaced the water endowment in the treelet algorithm with the natural log of annual precipitations (per capita). Column 2 uses a natural-resource intensity component in which the US water intensity has been adjusted with Mekonnen and Hoekstra's (2011) data. Column 3 considers both changes together. All estimates include a full set of sector dummies. We dropped 13 singleton observations. Clustered standard errors are in parentheses. Significance: *p<0.1, **p<0.05, ***p<0.01.

Quality of Composite Variables

To evaluate the reliability of our natural-resource intensity measure, we compare two alternative models. In particular, table A8 considers a four-factor model in which factor endowments are interacted with the corresponding factors intensities and a four-factor model in which intensities are synthesized by our natural-resource intensity measure. Notice that the latter model fits data better than the former. The sign of the factor endowments effect is preserved, whereas the interaction terms for capital endowments switch from a positive to a negative sign. This change is due to the fact that capital-intensive sectors are usually characterized by low natural resource intensity, and our synthetic measure of factor intensities captures this element noticeably well. This means that results in column 1 of table A8 are not in contrast with our main conclusions. In addition, comparing table A8 with table 1, we can argue that, in sectors characterized by low natural resource intensity ($\rho = 0$), the negative effect of R is driven by those countries relatively rich in water.

Table A8. Net exports (full and synthetic model, N=11,174)

	(1)	**(2)**
W	-0.257***	-0.240***
	(0.020)	(0.019)
L	0.302***	0.345***
	(0.029)	(0.027)
K	0.596***	0.925***
	(0.058)	(0.044)
H	-1.069***	-0.069
	(0.091)	(0.052)
$W \cdot w\ \ (W \cdot \rho)$	0.423***	0.087***
	(0.132)	(0.015)
$L \cdot l\ \ (L \cdot \rho)$	1.620***	0.062***
	(0.393)	(0.021)
$K \cdot k\ \ (K \cdot \rho)$	0.417***	-0.242***
	(0.048)	(0.200)
$H \cdot h\ \ (H \cdot \rho)$	2.670***	-0.172***
	(0.200)	(0.039)
Sector dummies	Yes	Yes
Hausman (p-value)	0.947	0.943
F-statistic	210.594	232.599
RMSE	3.305	3.283
R2	0.245	0.255

Notes: This table presents the OLS estimates of two different models. In column 1, we estimate a four-factor model in which factor endowments are interacted with the corresponding factor intensities; while in column 2, we replaced all factor intensities with the synthetic indicator ρ. Clustered standard errors are in parentheses. Significance: *p<0.1, **p<0.05, ***p<0.01.

We also test whether our synthetic model provides an accurate classification of sectors that are net exporters (net importers) of natural resources. In table A9, we compare two model-based classifications: the one coming from column 1 of table 1 and the one coming from column 1 of table A8. Table A9 presents both a simple Pearson's correlation analysis and a tetrachoric correlation analysis for binary variables.[2] Compared to a four-factor model, our classification of net exporters and net importers of natural resources presents a higher correlation and a smaller standard error compared to the classification of countries deriving from a four-factor model. In other words, with respect to a four-factor model, our reduced model provides a classification of net exporters that is closer to the classification based on observational data.

Table A9. Correlation and tetrachoric correlation (estimated models vs observed data)

	Reduced model	**Four-factor model**
Pearson’s correlation	0.358	0.326
Tetrachoric correlation	0.602	0.558
Standard Error	0.014	0.015
Two-sided test (H_0: independent)	0.000	0.000

Notes: This table compares the classification of net exporters and net importers of natural resources based on observed data with two model-based classifications: the one coming from our reduced model and the one obtained by estimating a four-factor interactional model.

Endogeneity Issues

Whereas our measures of natural resources are reasonably exogenous (see the discussion in the Data section as well as Debaere (2014)), one could argue that through export-led growth, international trade may affect capital accumulation (see, e.g., Chow, 1987). If this is the case, due to simultaneity problems, our main result on the role of capital may be biased. To address this potential endogeneity issue, we use an IV approach, selecting instruments that are correlated with capital endowments (instrument relevance) and conditionally uncorrelated with net exports (instrument exogeneity).

To construct these instruments, we use two additional datasets: the Armed Conflict Dataset (ACD, version 3-2005) and the Emergency Events Database (EM-DAT). The ACD

[2] Although a correlation analysis would lead to the same conclusions, a tetrachoric correlation provides more reliable results. In particular, it assumes a latent bivariate normal distribution for each pair of groups, and even if the means and variances of the latent classification are not identified, the correlation between them can be estimated from their joint distribution (see Edwards and Edwards, 1984).

comes from a joint project between the Department of Peace and Conflict Studies (Uppsala University) and the Centre for the Study of Civil War at the International Peace Research Institute (PRIO, Oslo). The basic unit in this database is an 'armed conflict' defined as "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths". The sample consists of all World countries over the period 1946-2005. However, given the fact that our capital measures refer to 1992, we restrict the sample to period 1946-1992.[3] The EM-DAT is provided by the Centre for Research on the Epidemiology of Disasters.[4] This dataset contains information on natural disasters around the World since 1900. However, to be consistent with the ACD dataset, we restrict the EM-DAT sample to the period 1946-1992; nonetheless, we can assume that 46 years represent a reasonable recovery period for natural events that occurred before 1946.

Since armed conflicts reduce human capital through casualties and destroy wealth, damaging plants and other capital goods, we expect a negative correlation between the year of the last armed conflict and the amount of capital (human and physical) available in a country. Therefore, the year of the last armed conflict will be our first IV. One could argue that conflicts may affect international trade thorough different channels and not only internal destruction. For this reason, we do not directly use a conflict measure but the number of years since the last conflict. Moreover, conflicts typically influence bilateral trade, whereas we consider the trade flow from a country and the rest of the world (i.e., the largest measure of multilateral trade). Taking advantage of the fact that ρ is certainly exogenous, our second IV will be the interaction

[3] The ACD provides information on both interstate conflicts and civil wars. Most of the hostilities occur between the government of a state and internal opposition groups without intervention from other states (72.62% of the sample), internationalized internal conflicts (11.07% of the sample) occur when other countries intervene in domestic disputes. Another 8.63% of events occurred between a state and a non-state group outside its territory; finally, only 7.68% of conflicts involved two or more countries.
[4] EM-DAT: The Emergency Events Database, Université Catholique de Louvain (UCLouvain), CRED, Brussels, Belgium, available at www.emdat.be.

term between the year of the last armed conflict and ρ. Finally, we also consider the number of deaths due to earthquakes and floods over the observational period. This variable is a direct measure of human capital loss and a proxy of the intensity of natural disasters, so it will also be related to material damages. Regarding the exogeneity of instruments, given the small number of external conflicts, the use of the temporal distance of the last conflict instead of any intensity measure, and the fact that natural disasters are orthogonal to exports, we expect no correlation between the second-stage error term and our conflict measures. However, both hypotheses related to instrument validity will be tested using traditional statistics. In this sense, the introduction of a second exogenous instrument such as natural disaster victims makes standard overidentification tests appropriate.

Table A10 reports both the first- and the second-stage results of the IV estimates. In columns 1-3, we only considered the first two IVs, whereas in columns 4-6 we also included the number of deaths due to natural disasters. In particular, columns 1-2 and 4-5 show the first-stage coefficients and the corresponding F-tests. As expected, there is a negative and strong correlation between the instruments and our measure of capital stock. The first-stage F tests on excluded instruments reveal that they are certainly relevant.

Columns 3 and 6 of table A10 contain the second-stage results of the IV estimates. Once we control for endogeneity problems, the coefficients of both C and $C \cdot \rho$ are slightly smaller but stable and statistically significant. Notice that the effect of R on net exports becomes statistically insignificant whereas the impact of $R \cdot \rho$ on NX remains positive and significant. This means that the HO theorem continues to hold, as well as our main conclusions. We also repeated the exercise in table A5 and correlation coefficients become even stronger for both physical and human capital (−0.266*** and −0.172***, respectively). Finally, on the basis of the Hansen J-test, we cannot reject the hypothesis that our IVs are correctly excluded in the second-stage equation.

Table A10. Net exports and capital (IV estimates, N=10,836)

	First-stage		**Second-stage**	**First-stage**		**Second-stage**
	C	$C * \rho$	NX	C	$C * \rho$	NX
	(1)	(2)	(3)	(4)	(5)	(6)
C			0.481***			0.486***
			(0.100)			(0.102)
$C \cdot \rho$			-0.233**			-0.232**
			(0.118)			(0.118)
R	0.155***	0.002	-0.019	0.155***	0.002	-0.020
	(0.001)	(0.003)	(0.038)	(0.001)	(0.003)	(0.038)
$R \cdot \rho$	0.001	0.161***	0.148***	0.001	0.161***	0.148***
	(0.001)	(0.003)	(0.038)	(0.001)	(0.003)	(0.038)
Last conflict	-0.510***	0.004		-0.496***	0.006	
	(0.004)	(0.007)		(0.004)	(0.007)	
Last conflict*ρ	0.003	-0.504***		0.003	-0.504***	
	(0.004)	(0.023)		(0.004)	(0.023)	
Deaths				-0.003***	-0.000	
				(0.000)	(0.000)	
Sector dummies	Yes	Yes	Yes	Yes	Yes	Yes
F-test	8280.10***	2635.81***	-	5542.64***	1804.46***	-
Hansen J-statistic		-		-	-	0.758
Chi-sq. (1) p-value	-	-	-	-	-	0.384

Notes: This table reports the IV estimates of our main regression in column 1 of table 2 columns 1-2 and 4-5 provide the first-stage coefficients with two and three IVs, respectively. Here, for the sake of readability, IV coefficients are multiplied by 1,000. Columns 3 and 6 give the corresponding second-stage results. Clustered standard errors are in parentheses. Significance: *p<0.1, **p<0.05, ***p<0.01.

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