

# International sanctions and the Dollar: Evidence from trade invoicing

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*Opinions expressed are those of the authors and do not necessarily reflect the views of the Banque de France or the Eurosystem*

# Motivation

## Dominant currency paradigm

- Half of global trade invoiced in dollars (Gopinath and Itskhoki, 2021 ; Boz et al, 2022)
- Complementarities in goods and asset markets → Implication for transmission of shocks

## Increased use of international sanctions by US and Western allies

- Can sanctions backfire and undermine the dollar dominance ?
- Direct and secondary US sanctions increase the risks of holding assets or invoice transactions in dollars
- Incentive by targeted countries and third parties to diversify away from the US dollar for international payments.

**This paper : Empirical evidence based on French micro data based on sanctions on Russia (2014-2020)**

## International sanctions on Russia by 2014

- Sanctions implemented by Western coalition since 2014 after the invasion of Crimea and Eastern regions of Ukraine
- Target both entities (e.g. companies, Gov. agencies) and individuals + certain categories of goods (military equipment, dual-use...)
- No classical trade policy (unlike Russia that targeted agriculture and agrifood foreign exports)

# Impact of sanctions on Trade and invoicing ?

## European + US sanctions : [Trade response](#)

- Raise trade costs (e.g. restrictions on payments / trade finance), Bans for certain transactions (e.g. military equipment, dual-use goods), Rising uncertainty...
- Expect negative impact on the total volume of transactions

## Extraterritorial dimension of US sanctions : [Extraterritoriality](#)

- Third parties expose themselves to penalties each time the US dollar is used in a transaction with a target individual / entity under sanction.
- Expect negative impact on the use of the US dollar to avoid US penalties

## US sanctions were strengthened over time [Sanctions in time](#)

- Impact on trade and currency invoicing in USD should get stronger over time

## On Russian side :

- Changes in Reserves composition may reduce likelihood to be paid in US dollars

## What this paper does

- **Empirical analysis of the trade impact of sanctions based on detailed micro-level trade data :**
  - French customs data that detail from 2011 to 2020 for each transaction the value in euros but also the currency of invoicing (Extra-EU only).
- Investigate the effects of sanctions on Russia starting in 2014 on trade and currency invoicing for transactions with Russia relative to control country (United States or OECD)
- Account for the important composition effects when looking at the change in the probability to invoice in US dollars due to firm selection
- **Mechanisms :**
  - ① The role of strategic complementarities between large exporters ;
  - ② Role of the currency composition in RU foreign reserves ;
  - ③ Identification of the impact of secondary sanctions : (1) Dual-use goods ; (2) Clients of a sanctioned French bank

## Related literature and contribution :

- Determinants of currency invoicing and role of the USD : Rey (2001); Bacchetta and van Wincoop (2005); Novy (2006); Goldberg and Tille (2008); Mukhin (2021); Tille et al. (2021); Gopinath and Stein (2021); Bahaj and Reis (2020); Gopinath and Itskhoki (2022)
- Dominance of the US dollar in currency invoicing and exchange rate pass through : Gopinath et al. (2010); Corsetti et al. (2020); Boz et al. (2022); Amiti et al. (2022); Chen et al. (2022); Berthou and Schmidt (2022)
- Declining share of the US dollar in international reserves : Arslanalp et al. (2022)
- Impact of sanctions on :
  - Trade : Hinz (2019); Felbermayr et al. (2020); Ahn and Ludema (2020); Crozet and Hinz (2020); Crozet et al. (2021)
  - Exchange rate : Eichengreen et al. (2022); Itskhoki and Mukhin (2022); Lorenzoni and Werning (2022)
  - Reserve currency : Brunnermeier et al. (2022)
  - Banks : Mamonov et al. (2022)

**Contribution in this paper → Choice of currency invoicing (USD vs EUR vs RUB) and transmission channels (liquidity in dollars in RU, dual-use goods, banks).**

## Sanctions impact on currency invoicing : event study

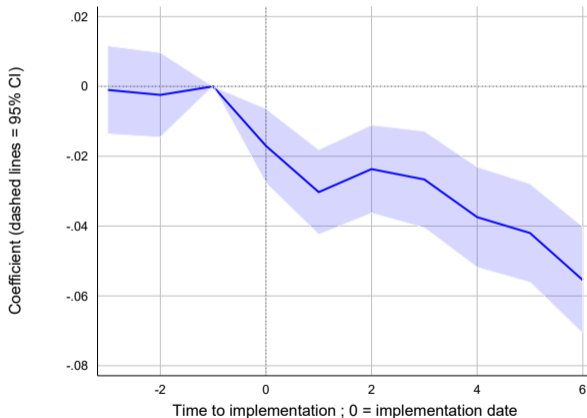
Empirical model compares the invoicing propensity of French firms in treated (Russia) versus non-treated (United States, robustness = OECD) countries over time.

- Control group : Reference countries with (i) stable invoicing patterns and (ii) unlikely to redirect the missing exports to Russia
- e.g. French exports to China increasingly invoiced in RMB

$$\text{Dollar}_{fijt} = \sum_{t=-2}^{t=6} \text{Russia}_{jt} + \gamma_{fij} + \theta_{fijt} + \epsilon_{fijt} \quad (1)$$

- Dimensions : firm = f, product = p, destination = j, year = t
- Fixed effects : firm-product-destination ( $\gamma_{fij}$ ) and firm-product-time ( $\theta_{fijt}$ ) . S.E. clustered in product-destination-time dimension.

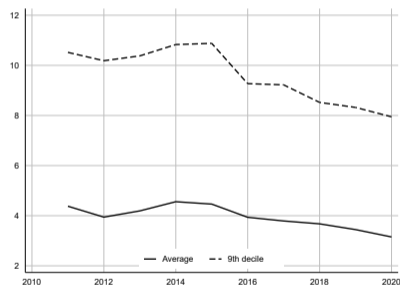
Figure – Event graph : probability to invoice in USD following sanctions in 2014 in Russia (continuing exporters)





# Mechanism #1 : Strategic complementarities

Figure – US export market share in Russia (by HS4 product)



Source : Authors' calculations, CEPII-BACI dataset

## Strategic complementarities

- Export restrictions in the US following self-inflicted sanction reduce the share of Russian imports satisfied by US products
- Strategic complementarities in the presence of variable markups and oligopolistic firms determine currency choice
- Expect stronger reduction in USD invoicing in HS4 products with larger ex-ante US market share in Russia

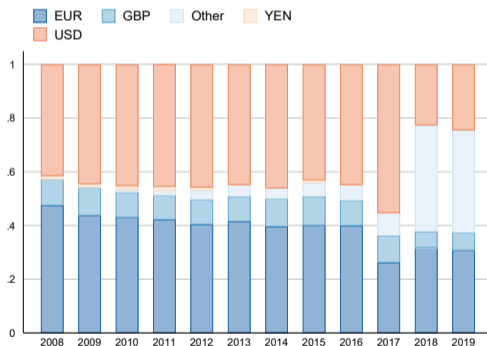
$$\begin{aligned} \text{Dollar}_{fijt} = & \alpha_1 \text{Russia}_{j, \text{Post}2014} + \gamma_{fij} + \theta_{fijt} + \epsilon_{fijt} \\ & + \alpha_2 \dots \times \text{US market share}_{\text{HS4}, \text{pre}2014}^{\text{RU}} \\ & + \alpha_3 \dots \times \ln \text{Size}_{ft} \\ & + \alpha_4 \dots \times \text{US market share}_{\text{HS4}, \text{pre}2014}^{\text{RU}} \times \ln \text{Size}_{ft} \end{aligned}$$

Table – Sanctions on Russia and currency invoicing : Strategic complementarities

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. var.				Dollar		
Destinations	Russia + United States				Russia + OECD	
RU sanctions (2014)	-0.021 <sup>a</sup> (0.005)	0.041 <sup>b</sup> (0.016)		-0.005 <sup>b</sup> (0.002)	-0.008 (0.007)	
... × US market share (HS4, pre-2014)	-0.303 <sup>a</sup> (0.091)	-1.946 <sup>a</sup> (0.395)	-1.946 <sup>a</sup> (0.394)	-0.217 <sup>a</sup> (0.045)	-0.794 <sup>a</sup> (0.164)	-0.791 <sup>a</sup> (0.163)
... × US M.S. × In Exporter size		-0.219 <sup>a</sup> (0.049)	-0.220 <sup>a</sup> (0.049)		-0.075 <sup>a</sup> (0.019)	-0.074 <sup>a</sup> (0.019)
... × In Exporter size		0.008 <sup>a</sup> (0.002)	0.009 <sup>a</sup> (0.002)		-0.001 (0.001)	-0.001 (0.001)
R <sup>2</sup>	0.93	0.93	0.93	0.88	0.88	0.88
Obs.	87,364	87,364	87,364	1,037,978	1,037,978	1,037,978
<i>fjp</i> -FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>fpt</i> -FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>jt</i> -FE	No	No	Yes	No	No	Yes

## Mechanism #2 : Composition of international reserves

Figure – Russia : Composition of international reserves



Source : data collected by Ito, H., and R. McCauley. (2020) .

# Controlling for international reserves

Table – Impact of sanctions : currency invoicing, controlling for reserves

Dep. var.	(1)	(2)	(3)	(4)
Period	Dollar 2011-2019			
RU sanctions (2014)	-0.028 <sup>a</sup> (0.004)	-0.025 <sup>a</sup> (0.004)	0.050 <sup>a</sup> (0.017)	0.046 <sup>a</sup> (0.017)
... × US market share (HS4, pre-2014)			-1.759 <sup>a</sup> (0.404)	-1.759 <sup>a</sup> (0.404)
... × US M.S. × ln Exporter size			-0.200 <sup>a</sup> (0.051)	-0.199 <sup>a</sup> (0.051)
... × ln Exporter size			0.009 <sup>a</sup> (0.002)	0.009 <sup>a</sup> (0.002)
International reserves in USD		0.060 <sup>a</sup> (0.015)	0.060 <sup>a</sup> (0.015)	
R <sup>2</sup>	0.93	0.93	0.93	0.93
Obs.	76,846	76,846	76,830	76,830
<i>f<sub>pj</sub></i> -FE	Yes	Yes	Yes	Yes
<i>f<sub>pt</sub></i> -FE	Yes	Yes	Yes	Yes

## Mechanism #3 : Secondary sanctions, Dual-use goods

1,272 Dual-use goods identified in Regulation (EU) No 428/2009 of the European Council of 5 may 2009

- Available concordance between Dual use goods classification and product-level classification in trade data (EU Combined nomenclature)
- In the United States, sanctions on dual-use goods are handled by the Bureau of Industry and Security of the US Department of Commerce. The list – Export Control Classification Number (ECCN) on the Commerce Control List (CCL) – has no mapping with product codes in the customs data and there is no easy match.

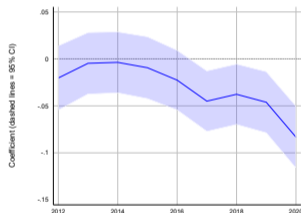
## Dual-use goods : Currency invoicing

Table – Impact of sanctions : Dual use goods, firms exporting 10 years in Russia

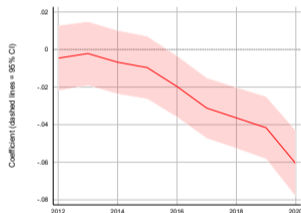
Dep. var.	(1)	(2)	(3)	(4)	(5)	(6)
			Dollar			
RU sanctions (2014)	-0.023 <sup>a</sup> (0.004)		0.041 <sup>b</sup> (0.016)		0.046 <sup>a</sup> (0.016)	
... × Dual use goods	-0.025 <sup>a</sup> (0.009)	-0.025 <sup>a</sup> (0.009)			-0.018 <sup>b</sup> (0.009)	-0.018 <sup>c</sup> (0.009)
... × US market share (HS4, pre-2014)			-1.946 <sup>a</sup> (0.395)	-1.946 <sup>a</sup> (0.394)	-1.855 <sup>a</sup> (0.398)	-1.858 <sup>a</sup> (0.398)
... × US M.S. × ln Exporter size			-0.219 <sup>a</sup> (0.049)	-0.220 <sup>a</sup> (0.049)	-0.214 <sup>a</sup> (0.049)	-0.214 <sup>a</sup> (0.049)
... × ln Exporter size			0.008 <sup>a</sup> (0.002)	0.009 <sup>a</sup> (0.002)	0.008 <sup>a</sup> (0.002)	0.009 <sup>a</sup> (0.002)
R <sup>2</sup>	0.93	0.93	0.93	0.93	0.93	0.93
Obs.	87,388	87,388	87,364	87,364	87,364	87,364
<i>fjp</i> -FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>fpt</i> -FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>jt</i> -FE	No	Yes	No	Yes	No	Yes

# Sanctions impact on dollar : time effects

Figure – Impact of sanctions : Dual use goods, firms exporting 10 years in Russia



(a) Control group : USA



(b) Control group : OECD

Note : French customs data, extra-EU.



## Mechanism #3 : Secondary sanctions, Sanctioned bank

- Large French banking group sanctioned by the US administration in 2014 due to transactions in US dollars with sanctioned country
- Identify clients of this banking group with the credit register
- Interaction term between Russia sanctions in 2014 and sanctioned bank dummy

Table – Sanctions on Russia and currency invoicing : The role of firm heterogeneity (2012-16)

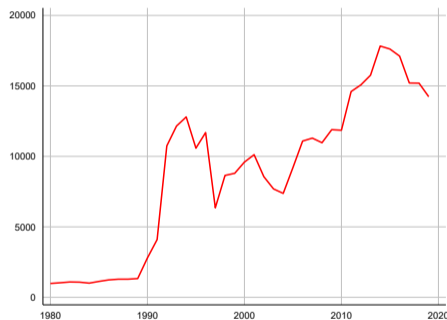
	(1)	(2)	(3)	(4)	(5)	(6)
Banks	Sanctioned	Not-sanctioned			All	
Exporters		All				Conti
Dep. var.			Dollar			
RU sanctions (2014)	-0.024 <sup>a</sup> (0.005)	-0.005 (0.007)	-0.004 (0.027)		-0.036 (0.044)	
... × Sanctioned Bank			-0.020 <sup>a</sup> (0.007)	-0.020 <sup>a</sup> (0.007)	-0.022 <sup>b</sup> (0.009)	-0.022 <sup>b</sup> (0.009)
... × ln exporter size			0.000 (0.002)	0.000 (0.002)	0.001 (0.002)	0.001 (0.002)
R <sup>2</sup>	0.95	0.94	0.95	0.95	0.95	0.95
Obs.	32,144	18,030	62,148	62,148	39,148	39,148
<i>fjp</i> -FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>fpt</i> -FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>jt</i> -FE	No	Yes	No	Yes	No	Yes

## Conclusion

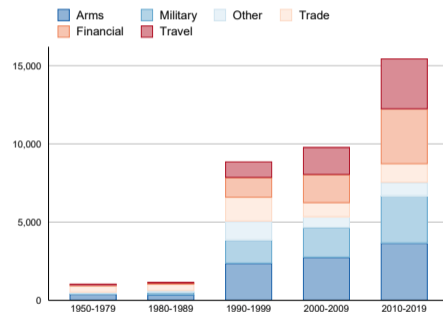
- New transmission channel of the impact of international sanctions on trade through currency invoicing in US dollars
- US dollar invoicing in French exports to Russia declined by 2014 (on top of the decline of trade volume)
- Evidence that strategic complementarities contributed to reduce USD invoicing
- Evidence of the impact of secondary sanctions through 1/ real-side channels (dual-use goods) and 2/ Financial channels (sanctioned banks)
- Robust to controlling for other channels, e.g. role of international reserves.

# International sanctions and the risks of Fragmentation

Figure – International sanctions (World, number of.)



(a) All sanctions



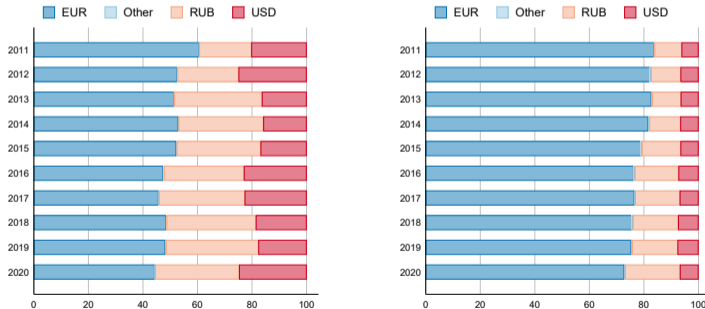
(b) by category

Source : Global Sanctions DataBase (GSDB, Felbermayr et al. 2020). These sanctions do not include classical trade instruments such as import tariffs.

## Changes in the composition of currencies

- Changes in the composition of exporters can affect the currency composition in aggregate exports

Figure – Share of currencies in French exports to Russia



(a) % of total exports

(b) % of transactions transactions

Note : French customs data, extra-EU.

## Changes in the composition of currencies

- Addressing the composition effect by working with continuous transactions (firm-product-year)

Figure – Share of currencies in French exports to Russia (continuing transactions)



(a) % of dollar



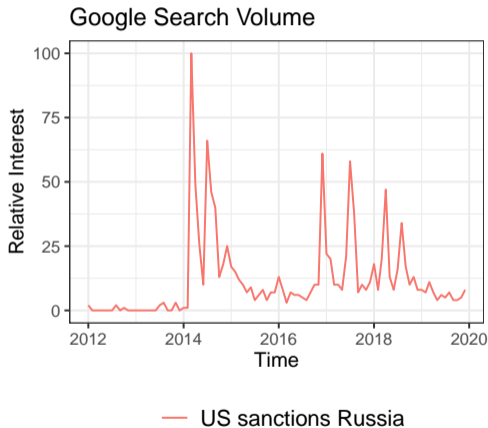
(b) % of euro



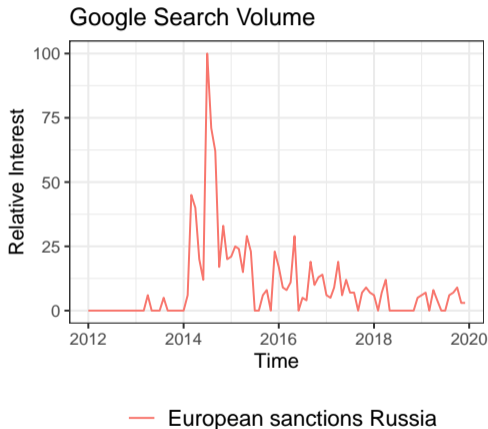
(c) % of ruble

Note : French customs data, extra-EU.

# Google trends search for “US sanctions Russia”



# Google trends search for “European sanctions Russia”



# Illustration of US law extraterritoriality

**US congress report** : “De-dollarization efforts in China and Russia” (Congressional Research Service, July 2021).

*“The dominance of the US dollar in cross-border transactions allows the United States unique visibility and levers of influence through policy measures such as financial sanctions that impede access to the US financial system or use of US dollar in international trade. Sanctions, imposed for foreign policy or national security objectives , restrict access to US payments and financial system, which is generally needed to process dollar transactions.” .*

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## Aggregate exports to Russia declined

- **Data** : French extra-EU customs data detailed by firm, partner country, product, month, and **invoicing currency**
- In 2020, French exports to Russia had declined by about 45% compared to the pre-sanctions period.

Figure – French total exports to Russia



(a) Ln total exports (value in euros)



(b) Ln nb. transactions

Note : French customs data, extra-EU.

## Changes in the composition of exporters

- **Composition effect** : The number of French exporters to Russia almost halved but the average size of exporters increased

Figure – The changing composition of exporters



(a) Ln nb. exporters



(b) Ln average exporter size

Note : French customs data, extra-EU.

## Sanctions impact on trade

Three empirical models comparing the export performance of French firms in treated (Russia) versus non-treated (United States, robustness = OECD) countries over time.

- Control group : Reference countries with (i) stable invoicing patterns and (ii) unlikely to redirect the missing exports to Russia
- e.g. French exports to China increasingly invoiced in RMB

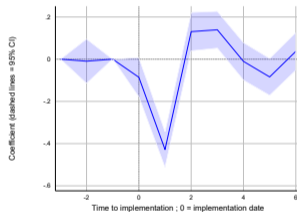
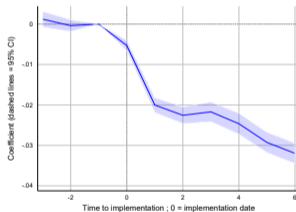
$$\mathbb{1}_{fpjt}^X = \sum_{t=-2}^{t=6} Russia_{jt} + \gamma_{fpj} + \theta_{fpt} + \epsilon_{fpjt} \quad (2)$$

$$\Delta \ln V_{fpjt} = \sum_{t=-2}^{t=6} Russia_{jt} + \gamma_{fpj} + \theta_{fpt} + \epsilon_{fpjt} \quad (3)$$

- Dimensions : firm = f, product = p, destination = j, year = t
- Fixed effects : firm-product-destination ( $\gamma_{fpj}$ ) and firm-product-time ( $\theta_{fpt}$ ) . S.E. clustered in product-destination-time dimension.

# Sanctions impact on trade : event study

Figure – Event graph : Impact of 2014 sanctions on Russia on firm-level exports



(a) Export probability (t)      (b) Log change in exports (t / t-1)

Note : French customs data, extra-EU.

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