
Franziska Thiemann

**The impact of information and
communication technology (ICT)
on international
trade in agri-food products:
a gravity approach**



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The impact of information and communication technology (ICT) on international trade in agri-food products: a gravity approach





Aus dem Institut für Agrarökonomie
der Christian-Albrechts-Universität zu Kiel

THE IMPACT OF INFORMATION AND COMMUNICATION
TECHNOLOGY (ICT) ON INTERNATIONAL TRADE
IN AGRI-FOOD PRODUCTS:
A GRAVITY APPROACH

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LIST OF ABBREVIATIONS

ACP-countries	African, Caribbean and Pacific Group of States
AoA	Agreement on Agriculture
BEC	Broad Economic Categories
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
bn	billion
B-t-B	business to business
B-t-C	business to consumer
B-t-G	business to government
CA	Controlled atmosphere
CAP	Common Agricultural Policy (of the European Union)
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
DEL	Direct Exchange Line
DFID	Department for International Development
EDI	Electronic Data Interchange
EIA	U.S. Energy Information Administration
EU	European Union
FE	fixed effect
FGLS	Feasible Generalised Least Squares
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GLS	generalised least squares
GPML	Gamma Pseudo-Maximum Likelihood
GPT	general purpose technology
H-O	Heckscher-Ohlin
HS	Harmonised Commodity Description and Coding System, Harmonised Systems
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
ibd.	ibidem (lat.), meaning the same place
ICT	Information and communication technologies
IMT-2000	International Mobile Telecommunications-2000
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IT	Information Technology (or Technologies)
ITU	International Telecommunication Union
km	kilometres
LSDV	Least Squares Dummy Variable Model
n. d.	no date
NBR	negative binominal regression
NCSA	National Center for Supercomputer Applications
NLS	Nonlinear Least Squares
No.	Number



List of abbreviations

NTBs	Non-tariff trade barriers
NTMs	Non-tariff trade measures
OLS	Ordinary least squares
org.	organised
p.	page
PML	Pseudo-Maximum Likelihood
pp.	pages
PPML	Poisson Pseudo-Maximum Likelihood
PSTN	Public Switched Telephone Network
RE	random effect
Rev.	Revision
RFID	Radio Frequency Identification
SIM	Subscriber Identity Module
SITC	Standard International Trade Classification
SPS	Sanitary and Phytosanitary
STAT	ITU's Market Information and Statistics Division
suest	seemingly unrelated estimation
t	tonne(s)
TCP	Transmission Control Protocol
TEUs	Twenty-foot Equivalent Units
U.S., US	United States of America
UN	United Nations
USB	Universal Serial Bus
viz.	videlicet (lat.), that means
VoIP	Voice over Internet Protocol
Vol.	Volume
WDI	World Development Indicator
WLL	Wireless Local Loop
WTO	World Trade Organisation
www	world wide web
ztv	zero-trade values

LIST OF VARIABLES

A	constant of proportionality
adj	adjacency
Dist, dist	distance
dum00_04	dummy variable for years 2000 to 2004
dum05_09	dummy variable for years 2005 to 2009
dum08	dummy variable for year 2008
fuel	fuel
GDP, gdp	Gross Domestic Product
gdphM	GDP per head for importing countries
gdphX	GDP per head for exporting countries
gdpM	GDP for importing countries
gdpX	GDP for exporting countries
i	country i
inet	internet
inetM	internet subscribers in importing countries
inetX	internet subscribers in exporting countries
j	country j
l	logarithm
lang	common language
ln	natural logarithm
mob	mobile phone
mobM	mobile phone subscribers in importing countries
mobX	mobile phone subscribers in exporting countries
POP, pop	population
popM	population in importing countries
popX	population in exporting countries
rfac	relative factor endowments
sim	similarity index of economic size
t	time index $t=1, \dots, T$
tel	fixed telephone lines
telM	fixed telephone lines in importing countries
telX	fixed telephone lines in exporting countries
TV, tv	trade value
tvm	trade value in millions
Y	national income



LIST OF NATIONAL CODES

AGO	Angola	GTM	Guatemala	ROU	Romania
ARE	United Arab Emirates	HKG	China, Hong Kong	RUS	Russian Federation
ARG	Argentina	HND	Honduras	SAU	Saudi Arabia
ARM	Armenia	HUN	Hungary	SDN	Sudan
AUS	Australia	IDN	Indonesia	SEN	Senegal
AUT	Austria	IND	India	SGP	Singapore
BEL	Belgium	IRL	Ireland	SVK	Slovakia
BEL-LUX	Belgium-Luxembourg	IRN	Iran (Islamic Republic of)	SVN	Slovenia
BEN	Benin	IRQ	Iraq	SWE	Sweden
BFA	Burkina Faso	ISL	Iceland	SWZ	Swaziland
BGD	Bangladesh	ISR	Israel	SYR	Syrian Arab Republic
BLR	Belarus	ITA	Italy	TGO	Togo
BRA	Brazil	JAM	Jamaica	THA	Thailand
BWA	Botswana	JOR	Jordan	TKM	Turkmenistan
CAN	Canada	JPN	Japan	TUN	Tunisia
CHE	Switzerland	KAZ	Kazakhstan	TUR	Turkey
CHL	Chile	KEN	Kenya	TZA	Tanzania (United Republic of)
CHN	China	KOR	Republic of Korea	UKR	Ukraine
CIV	Côte d'Ivoire	KWT	Kuwait	URY	Uruguay
CMR	Cameroon	LBN	Lebanon	USA	United States of America
COL	Colombia	LCA	Saint Lucia	VEN	Venezuela (Bolivarian Republic of)
CRI	Costa Rica	LSO	Lesotho	VNM	Viet Nam
CUB	Cuba	LTU	Lithuania	YEM	Yemen
CYP	Cyprus	LUX	Luxembourg	ZAF	South Africa
CZE	Czech Republic	LVA	Latvia	ZAF-Union	South Africa Custom Union
DEU	Germany	MLI	Mali	ZMB	Zambia
DNK	Denmark	MAR	Morocco	ZWE	Zimbabwe
DOM	Dominican Republic	MDA	Republic of Moldova		
DZA	Algeria	MEX	Mexico		
ECU	Ecuador	MOZ	Mozambique		
EGY	Egypt	MWI	Malawi		
ESP	Spain	MYS	Malaysia		
EST	Estonia	NAM	Namibia		
ETH	Ethiopia	NGA	Nigeria		
FIN	Finland	NLD	Netherlands		
FJI	Fiji	NOR	Norway		
FRA	France	NZL	New Zealand		
FRO	Faeroe Islands	OMN	Oman		
GBR	United Kingdom of Great Britain and Northern Ireland	PAK	Pakistan		
GEO	Georgia	PAN	Panama		
GHA	Ghana	PER	Peru		
GIN	Guinea	PHL	Philippines		
GRC	Greece	POL	Poland		
		PRI	Puerto Rico		
		PRT	Portugal		
		PRY	Paraguay		



Chapter 1

INTRODUCTION

1.1 Motivation

Two mega trends have shaped world markets during the past quarter century. One is globalisation the other is the rapid spread of digital information and communication technologies (ICT).

Globalisation is a worldwide phenomenon which emerged from the increasingly intensive interactions of cultures, countries, markets, organisations, and people, all embedded in a common global natural environment [Leamer 2007]. There is wide agreement that the intensification of international trade has been one of the key drivers of the current era of globalisation [Bhagwati 2004, Leamer 2007, Wolf 2004]. World trade, in turn, was stimulated by decreasing tariffs, as well as falling transport and transaction costs. The reductions in transport and transaction costs both were induced by significant technology changes, the container revolution has reduced transport cost, and information technology and the modern supply chain have reduced transaction cost. Taken together, these changes have led to unpredicted growth in world trade which, according to UN Comtrade more than doubled from 6.5 trillion US\$ in 2000 to 16.2 trillion US\$ in 2008 [UN Comtrade 2012].

During the current era of globalisation, which began sometime around the beginning of the third quarter of the last century [Martell 2007], digital communication technology has changed dramatically. Whereas the telephone and telex machines dominated long distance communication in the 1970s, email on the internet, the web, and now the smartphone have revolutionised long distance communication. The organisation and coordination of global supply chains is unthinkable without the use of modern digital information and communication technologies.

Although globalisation and the spread of digital IT may be regarded as separate issues, they may actually be interlinked. In particular, we may ask whether ICT