ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL

A DUTCH DISEASE APPROACH INTO THE PREMATURE DEINDUSTRIALIZATION

PhD THESIS

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Department of Economics

Economics Programme

AUGUST 2022

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To my mom,

FOREWORD

When I had started to study on my PhD thesis, I promised myself to abide by the old dictum that perfect is the enemy of good. I must admit that there were times when I was quite close to breaking my promise, but I struggled a lot to be back on my track.
My thesis subject was ready even before the comps, and thankfully my advisor accepted it when I had submitted my proposal. Born into a midsize country which has been burdened with colossal amount of foreign debt and got bogged down in deindustrialization process, I wanted to examine the global forces driving developing world into underdevelopment characterized by the decline in manufacturing industry. My primary motivation was to uncover the adverse effects of globalization on the path of economic development in developing countries so as to find recipes for escaping the dreadful fate of premature deindustrialization. If my study could ignite a new interest in this line of research, I will consider that I fulfilled my scientific objective.
I fully dedicate my PhD thesis to my mom whom I lost during my writing period. She always supported me when I had chosen to trod down the path of science, and made great sacrifices for my success. I wish she could have this hardcopy in her hands.
My fiancé Tuğçe Nur YÜRÜR never left me alone in this seemingly never-ending endeavor, and never spared her support when I craved for it. Without her I could not find the internal strength to complete this study.
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When I sent my paper draft to Fuad HASANOV (PhD), he showed an immense kindness to give his feedbacks within his tight schedule. I think I was wise in following closely his critiques. Osman DOĞAN (PhD) read some part of the work line by line, and kindly revealed its shortcomings. He helped me a lot to develop my econometric methodology.
Without the help and contribution of all these people I have named above, this thesis could not written at all. All mistakes are of course mine.
Finally, I cannot hide my happiness to see my graduate studies finish at last. What a rollercoaster it was…

June 2022 Muhammet Sait ÇAKIR
(PhD)

TABLE OF CONTENTS

Page

FOREWORD .... **ix**
TABLE OF CONTENTS .... **xi**
ABBREVIATIONS .... **xiii**
SYMBOLS .... **xv**
LIST OF TABLES .... **xvii**
LIST OF FIGURES .... **xix**
SUMMARY .... **xxi**
ÖZET .... **xxiii**
1. INTRODUCTION **1**
2. EMPIRICAL LITERATURE AND DESCRIPTIVE STATISTICAL ANALYSIS ON PREMATURE DEINDUSTRIALIZATION **9**
3. THEORETICAL FRAMEWORK FOR EXPLAINING THE PREMATURE DEINDUSTRIALIZATION: THEORETICAL LITERATURE **25**
3.1 Trade Globalization 26
3.2 Financial Globalization 42
3.3 Demand-side Approaches to Deindustrialization 53
3.4 The Role of Institutions 57
4. WHY IT MATTERS? THE SIGNIFICANCE OF MANUFACTURING INDUSTRY FOR DEVELOPING COUNTRIES AND CONSEQUENCES OF PREMATURE DEINDUSTRIALIZATION **59**
5. EMPIRICAL MODEL **71**
5.1 Measuring the Real Equilibrium Exchange Rate 71
5.2 Model 76
5.2.1 Construction of the overvaluation index 77
5.2.2 Capital flows and overvaluation 79
5.2.3 Data and estimation 82
5.2.4 Robustness checks 87
5.2.4.1 Nonlinearity 88
5.2.4.2 Different measurements of deindustrialization 89
5.2.4.3 Methodology and different dataset 92
5.2.4.4 Causality 95
5.2.4.5 The role of inequality, supply chain, and institutional shocks 106
6. CONCLUSION **121**
REFERENCES **139**
APPENDICES **155**
CURRICULUM VITAE **177**

ABBREVIATIONS

AIC	: Akaike Information Criteria
AMG	: Augmented Mean Group
ARDL	: Autoregressive Distributed Lag
BIC	: Bayesian Information Criteria
BS	: Balassa-Samuelson
CADF	: Cross-sectionally Augmented Dickey-Fuller
CCEMG	: Common Correlated Effects Mean Group
CD	: Cross-section Dependency
CIPS	: Cross-sectionally Augmented Im-Pesaran-Shin
CPI	: Consumer Price Index
DM	: Davidson-McKinnon
FDI	: Foreign Direct Investment
FE	: Fixed Effect
FIRE	: Finance, Insurance, and Real Estate
FX	: Foreign Exchange
GDP	: Gross Domestic Product
GGDC	: Groningen Growth and Development Center
GLS	: Generalized Least Squares
GMM	: Generalized Method of Moments
GVC	: Global Value Chain
HQIC	: Hannan-Quinn Information Criteria
IFS	: International Financial Statistics
IMF	: International Monetary Fund
LLC	: Levin-Lin-Chu
LM	: Lagrange Multiplier
MMSC	: Maximum Likelihood based Model Selection Criteria
OLS	: Ordinary Least Squares
PPP	: Purchasing Power Parity
PWT	: Penn World Tables
TIVA	: Trade in Value-Added
UNDESA	: United Nations Department of Economic and Social Affairs
US$	: The Unites States Dollar
VAR	: Vector Autoregressive
XRAT	: Nominal Exchange Rate

SYMBOLS

α, ρ	: First-order autoregressive parameter
μ_i	: Country fixed effect
e	: nominal exchange rate
f_t	: unobserved common factor
ln	: natural logarithm
N	: Size of cross-sectional dimension
P	: lower triangular Cholesky factor
PER_T	: Time dummy for period T
P_N	: Price of nontradable goods
RCA_{ij}	: Revealed comparative advantage
T	: Size of time dimension
ε_{it}	: idiosyncratic error term
Θ_i	: heterogenous factor loading
Ω, $\sum$	: Variance-Covariance matrix

LIST OF TABLES

Page

Table 2. 1 : Industry peak shares and inflection points over time............................ **22**

Table 4. 1 : Decomposition of overall productivity growth, 1990-2005. .... **67**
Table 4. 2 : Decomposition results for 1990-2010, % **69**

Table 5. 1 : The Balassa-Samuelson Effect. **78**
Table 5. 2 : The impact of capital inflows on overvaluation index: Fixed effects model estimation………………………………………………………………**79**
Table 5. 3 : Panel VAR GMM estimations……………………………………...**80**
Table 5. 4 : Panel VAR Granger causality…………………………………………**81**
Table 5. 5 : The descriptive statistics of the data…………………………………..**83**
Table 5. 6 : Slope Homogeneity Test………………………………………………**85**
Table 5. 7 : The Baseline Regression Results………………………………………**85**
Table 5. 8 : The test for cross-section dependency…………………………………**86**
Table 5. 9 : The second generation panel unit root test……………………………. **87**
Table 5. 10 : The regression results for the overvaluation vs undervaluation periods……………………………………………………………………………**88**
Table 5. 11 : Regression results for different measurements of deindustrialization..**91**
Table 5. 12 : The baseline regression results with the raw real exchange rate index…………………………………………………………………………………**93**
Table 5. 13 : The Baseline Regression Results with the real exchange rate index based on CPI………………………………………………………………….... **94**
Table 5. 14 : The test for exogeneity…………………………………………….... **103**
Table 5. 15 : The Panel GMM estimations with the real exchange rate index adjusted for the BS effect……………………………………………………………… **104**
Table 5. 16 : The Panel GMM estimations with the real exchange rate index unadjusted for the BS effect…………………………………………………..**105**
Table 5. 17 : Descriptive statistics………………………………………………... **107**
Table 5. 18 : Selection order criteria……………………………………………… **111**
Table 5. 19 : Panel VAR GMM estimation………………………………………. **112**
Table 5. 20 : Panel VAR Granger causality test………………………………….. **115**
Table 5. 21 : Levin-Lin-Chu unit-root test………………………………………...**119**
Table 5. 22 : Hadri LM test………………………………………………………..**119**
Table 5. 23 : Forecast error variance decomposition……………………………...**120**

LIST OF FIGURES

Page

Figure 2. 1: Deindustrialization over time **22**
Figure 3. 1: Participation in GVCs and Deindustrialization between 1995-2011 .... **40**
Figure 3. 2: Participation in GVCs and Deindustrialization between 2005-2016. ... **41**
Figure 5. 1: Eigenvalue stability condition **81**
Figure 5. 2: Response of overvaluation index to capital flow shocks....................... **81**
Figure 5. 3: Eigenvalues of the companion matrix and the unit circle. **112**
Figure 5. 4: Orthogonalized impulse-response functions. **116**
Figure 5. 5: Response of Gini to growth shocks. **117**

A DUTCH DISEASE APPROACH INTO THE PREMATURE DEINDUSTRIALIZATION

SUMMARY

We explore the main causes and consequences of the premature deindustrialization phenomena. We argue that local currency overvaluations mainly associated with a surge in capital inflows into the emerging market economies following the deregulation of their capital accounts severely hurt the output share of manufacturing industry. First, we empirically establish a causal link from capital flows to local overvaluations. According to the two-way error component model which controls for the full set of country and time fixed effects, a surge in capital flows by one standard deviation is associated with an overvaluation of 1.67 percent. To address the possible endogeneity between capital flows and real exchange rate, we run two-variate first-order panel vector autoregressive model since the feedback effects from overvaluation to net financial inflows might introduce a bias into the fixed effect estimation. When we isolate the effect of positive capital inflow shock of one standard deviation by the Cholesky decomposition, we find that it is statistically significantly associated with an immediate overvaluation in real terms with 95 percent confidence level. Then we construct our baseline regression model. Applying the second generation estimators allowing for cross-section dependency (Augmented Mean Group and Common Correlated Effects Mean Group), we run a panel data regression model based on a sample of 39 developing countries in Latin America, Sub-Saharan Africa, East Asia, North America, and Europe from 1960 to 2017. We find that an overvaluation of 50 percent which corresponds approximately to one and half standard deviations is associated with a contraction of manufacturing output share as high as 1,25 percent over the five year period. With the turn of new century, the developing countries also experienced a massive deindustrialization by shedding manufacturing value-added as large as 1.24% of national income. Moreover, the evidence suggests that the relationship between real exchange misalignments and the manufacturing share in output might be nonlinear so that the manufacturing competencies which have been eroded by local currency overvaluations in real terms cannot simply be brought back during the undervaluation periods. We also show that the baseline regression results are robust to different data sets, alternative real exchange rate/deindustrialization measurements, and dynamic model specifications which allow us to treat the real exchange rate as endogenous variable to address any potential concern regarding the simultaneity bias. As a further robustness check on our findings, we empirically examine the effects of supply chain disruptions, inequality shocks, and institutional innovations on the path of industrialization in developing countries by running a panel vector autoregressive model. We found that deterioration in income distribution unequivocally harms the developing countries' bid for industrialization while better institutions proxied by an improvement regulatory quality invariably foster it. On the other hand, the effects of supply chain disruptions on the pace of industrialization

follow a nonlinear path, showing the great resilience of local industries in absorbing imported input bottlenecks through intermediate input import substitution. We also provide evidence that backward participation into GVCs and regulatory quality do not mutually Granger-cause each other, and suggest that the well-established link from better governance to GVCs may be missing in the developing country case.

Based on these empirical findings, the need for a comprehensive industrial policy along with a firm use of capital controls and macroprudential measures given a robust institutional framework comes out as the main policy implication of our work, and they are duly discussed in light of recent developments in the literature.

ERKEN SANAYİSİZLEŞMEYE HOLLANDA HASTALIĞI YAKLAŞIMI

ÖZET

Bu tezin amacı gelişmekte olan ülkelerin maruz kaldıkları erken sanayisizleşmenin nedenlerine ve temel dinamiklerine ampirik bir model aracılığıyla ışık tutmaktır. Tezin teorik çerçevesini kurarken çıkış noktamız, sanayisizleşme ile erken sanayisizleşmenin farklı iktisadi süreçlere tekabül ettiği olgusudur. Literatürde sanayisizleşme genellikle gelişmiş ülkelere ait bir ekonomik görüngü ve iktisadi olgunluk göstergesi olarak ele alınırken, erken sanayisizleşme gelişmiş bir imalat sanayii altyapısı kuramamış ülkelerin küreselleşme süreciyle birlikte üretken güçlerindeki nispi gerilemeyi ifade etmektedir.

İktisadi kalkınma sürecinin başlangıcında kaynakların tarımdan imalat sektörüne aktarılmasıyla birlikte sanayinin milli gelir ve istihdamdaki payı ilkin bir artış gösterirken, gelişimin ileriki safhalarında sanayideki üretkenlik artışlarının hızlanması ve refah artışına bağlı tüketim kalıplarının değişmesi sonucu hizmet sektörünün payı sanayi aleyhine artış gösterir ve ülkeler doğal yollardan sanayisizleşme sürecine girerler. İktisadi kalkınmışlığın ölçütü olarak kişi başı milli gelirle imalat sanayinin milli gelir ve istihdamdaki payını birlikte resmettiğimizde ters-U biçimli bir eğri elde ederiz.

Diğer yandan, erken sanayisizleşme verimlilik ve refah artışlarının doğal bir ürünü olmaktan ziyade küreselleşmenin ticari ve mali etkileri sonucu gelişmekte olan ülkelerin sanayileşme sürecinin akamete uğramasını ifade etmektedir. Bu olgu yukarıda tasvir ettiğimiz ters-U biçimli eğrilerin tarihsel süreç içerisinde aşağı yönde ve sola doğru kaymasıyla kendisini ortaya koyar; aşağı yönlü kaymalar, geç sanayileşen ülkelerde sanayinin payının hiçbir zaman gelişmiş ülkelerin zirve değerlerine ulaşamayacağı, sola doğru kaymalar ise sanayisizleşme sürecinin gelişmiş ülke deneyimlerine kıyasla çok daha erken kişi başı gelir düzeylerinde başlayacağı anlamına gelmektedir. Dolayısıyla erken sanayizleşmeyi tahlil etmeye dönük teorik çerçeve gelişmiş ülke örneklerini açıklamak için geliştirilen modellerden nitel farklılıklar barındırmak zorundadır.

Gelişmekte olan ülkelerin (erken) sanayisizleşmesini tahlil ederken en dikkat çekici nokta bu olgunun tarihsel süreç içerisinde küreselleşmenin 2000'li yıllarla birlikte hızlandığı moment ile çakışmasıdır. Küreselleşmenin ivmesini artırmasıyla birlikte; Çin Halk Cumhuriyeti ve sair Doğu Asya ülkelerini bir kenara koyduğumuzda gelişmekte olan ülkelerin kahir ekseriyetinin hızla sanayisizleşme sürecine girdiğini gözlemlemekteyiz. Bu tezin amaçlarından bir tanesi de erken sanayisizleşmeyle küreselleşme arasındaki nedensellik mekanizmalarını ampirik olarak ortaya koymaktır.

Küreselleşmenin erken sanayisizleşme üzerindeki etkilerini tahlil ederken temel olarak iki kanaldan söz etmek mümkündür. Birinci kanal, ticari küreselleşmenin yarattığı ve gelişmekte olan ülkeri etkisi altına aldığı fiyat ve katma-değer dinamikleridir. Mal ve

hizmet ticaretinin önündeki gümrük ve diğer kısıtlayıcı tedbirlerin ilgasıyla birlikte, ticarete konu olan malların, özellikle de mamul malların fiyat hareketleri dünya ticaretine hakim olan gelişmiş ülkelerin içsel dinamiklerince belirlenir hale gelmiştir. Gelişmiş ülkelerde sanayinin kaydetmiş olduğu hızlı verimlilik artışları mamul mal fiyatlarında nispi gerilemelere neden olmuş; dünya pazarında kapladıkları yer itibariyle fiyatlara etki etme gücü bulunmayan gelişmekte olan ülkeler küresel ticarette sanayi aleyhine oluşan fiyat dinamiklerini ithal etmek durumunda kalmışlardır. Sanayileşmelerini henüz tamamlayamamış ülkeler dış ticaret kanalıyla maruz kaldıkları olumsuz fiyat gelişmelerinin baskısı altında imalat sanayilerini koruyamaz duruma düşmüşlerdir. Ticari küreselleşmenin bir diğer yönü de tedarik zincirlerlerinin küresel mal ticaretinin büyük bölümünü oluşturması olgusunda yatar. Nitelikli girdi temin etme, hazır ihracat pazarı bulma imkânı sunması nedeniyle gelişmekte olan ülkelerin sanayileşmesine hizmet edeceği varsayılan küresel değer zincirleri bu ülkelerin sanayileşme çabalarına beklenen katkıları yapmaktan uzak kalmıştır. İçinde barındırdığı asimetrik güç ilişkileri yüzünden küresel değer zincirleri gelişmekte olan ülkelerde bağımlı bir sanayileşmeye yol açmıştır. Gelişmekte olan ülkeler küresel değer zincirlerine eklemlenirken; hiyerarşik yapısı nedeniyle zincirin düşük katma değer yaratan, emek yoğun halkalarına yönelmek zorunda kalmışlardır. Küresel değer zincirlerine geriden eklemlenen gelişmekte olan ülkeler yüksek gümrük duvarları sayesinde inşa etmiş oldukları yerli aramalı üretim kapasitelerini yitirmiş ve bunun sonucunda brüt sınai üretim/ihracattaki yerli katma-değer payı ciddi ölçüde aşınmıştır. Küresel tedarik zincirlerine katılımla birlikte ithal girdi kullanımındaki artışa bağlı olarak gerçekleşen yerli katma-değer payındaki azalma üretim ve ihracattaki hacim artışıyla telafi edilemeyince imalat sanayinin milli gelirdeki payı gerilemiş, erken sanayisizleşme dinamikleri harekete geçmiştir.

Küreselleşmenin erken sanayisizleşme üzerindeki bir diğer etkisi, gelişmiş ülke kaynaklı mali sermaye hareketlerinin gelişmekte olan ülke yerel para birimlerinin aşırı-değerlenmesine yol açmasıyla ortaya çıkmaktadır. Gelişmiş ülke parasal otoritelerinin almış oldukları genişleyici kararlar neticesinde sermaye hesabını serbestleştiren/kuralsızlaştıran gelişmekte olan ülkelere dönük güçlü sermaye girişleri yaşanmış, bu durum reel kur endeksinde sözkonusu ülkelerin iktisadi temellerinden kopuk bir aşırı-değerlenmeye neden olmuştur. Reel anlamda aşırı-değerlenen yerel para birimleri nispi fiyatları sınai malların aleyhine değiştirmiş, bu da gelişmekte olan ülke imalat sanayilerinde rekabet gücünün zayıflamasına yol açmıştır. Bir başka deyişle, gelişmekte olan ülkeler sermaye girişleri kaynaklı Hollanda hastalığına yakalanmışlardır. Yerel para biriminin aşırı-değerlendiği dönemlerde yaşanan köklü sınai katma-değer ve istihdam kayıpları; sermaye hareketlerinin tersine çevrildiği, yerel para birimlerinin ağır kayıplar yaşandığı dönemlerde yerine konulamamış, erken sanayisizleşme gelişmekte olan ülkelerde kök salmıştır. Dahası mali küreselleşmenin yoğunlaştığı dönemlerde ödemeler bilançosunda yer alan cari hesap birincil dengesi gelişmekte olan ülkelerde önemli ölçüde bozulmuştur. Bir başka deyişle, küresel getiri farklılığı ve ülke bazlı faktör donanımındaki heterojenitenin etkisiyle gelişmekte olan üllkelerden dünya mali piyasalarına ciddi bir mali transfer gerçekleşmiş; sınai sermaye birikiminde kullanılabilecek kaynaklarda önemli kayıplar yaşanmıştır.

Yukarıda anahatlarını çizdiğimiz teorik çerçeveyi göz önünde bulundurarak erken sanayisizleşmenin nedenlerine dair ampirik bir model kurmaktayız. Öncelikle, gelişmekte olan ülkelerin temel iktisadi göstergelerinden bağımsız (ekzojen) olduğunu kabul ettiğimiz sermaye hareketleriyle yerel para birimlerinin aşırı-değerlenmesi arasındaki nedenselliği ampirik olarak göstermek maksadıyla Balassa-Samuelson etkisinden arındırdığımız reel kur endeksini net mali akımların milli gelire oranıyla açıkladığımız modelimizi ülke ve zaman etkileriyle genişletip sabit etkiler tahmincisiyle tahmin ediyoruz. Buna göre, sermaye girişlerinde yaşanan bir standart sapmalık artış yerel para biriminde yüzde 1,67 oranında aşırı değerlenmeye yol açmaktadır. Sermaye hareketleriyle reel kur arasındaki olası bir eşanlılık sapmasının sabit etkiler tahmincisinin tutarlılığını bozması ihtimaline karşı, her iki değişkeni de endojen kabul ettiğimiz panel vektör otoregresif (VAR) modeli Arellano-Bond panel genel momentler yöntemi (GMM) tahmincisiyle tahmin ediyoruz. Etki-tepki katsayılarını elde ederken kullandığımız Cholesky ayrıştırması yöntemiyle sermaye girişlerindeki bir standart sapmalık pozitif şokun etkisini tecrit ettiğimizde, şokun gerçekleştiği dönemde reel kur endeksinde yüzde 95 güven düzeyinde anlamlı bir aşırı-değerlenme gerçekleştiğini görmekteyiz. Reel kur ile sermaye girişleri arasında yüzde 5 anlamlılık düzeyinde karşılıklı bir Granger-nedenselliği bulunmakla birlikte, olasılık değerlerine baktığımızda bu nedensellik ilişkisinin sermaye girişlerinden reel kur değerlenmesine doğru daha güçlü olduğunu tespit etmekteyiz. Güçlü yerel para sermaye girişlerini teşvik ederken, sermaye girişleri yerel para biriminin aşırı-değerlenmesine yol açmaktadır.

Temel regresyon modelimizde sanayileşme süreciyle ekonomik kalkınma ilişkisini göz önünde bulundurarak sermaye girişlerine bağlı reel para birimindeki aşırı-değerlenme ile ticari küreselleşmenin imalat sanayisinin ulusal katma-değerden aldığı pay üzerindeki etkisini gösteriyoruz. Reel kur endeksini Balassa-Samuelson etkisinden arındırdığımız için aşırı-değerlenme verimlilik artışlarının ötesindeki nispi fiyat hareketlerinin bir ölçüsü olarak hizmet görmekte, bir ülkedeki ticarete konu olan malların uluslararası rekabetçilik seviyesini doğrudan ölçmektedir. Balassa-Samuelson etkisinden arındırma sürecinde ülke ve zaman sabit etkileri bir bütün olarak modellendiği için reel kur endeksi hem ülkeler arasında hem de zaman içindeki değişmeleri sapmasız bir şekilde ölçmektedir.

Verisetimiz 1960 yılından 2017 yılına kadar Latin Amerika, Sahara-altı Afrika, Doğu Asya, Kuzay Amerika ve Avrupa'da bulunan 39 gelişmekte olan ülkeyi kapsamaktadır. Reel kur endeksindeki kısa vadeli dalgalannmaların modelimizin temel sonuçları üzerindeki etkilerini hafifletmek maksadıyla literatürle uyumlu bir şekilde 5-yıllık ortalamalarla verimizi yeniden düzenliyoruz. Yatay kesit bağımlılığını dikkate alan ikinci nesil tahmincilerinden AMG ile modelimizin katsayılarını elde ediyoruz. Bir buçuk standart sapmalık artışa denk gelen yüzde 50'lik reel kur değerlenmesinin beş yıllık bir dönemde imalat sanayinin milli gelir payında yüzde 1,25 gibi ciddi bir kayba yol açtığını (Hollanda hastalığı) görmekteyiz. Dahası küreselleşmenin hız kazandığı 2000'li yılları temsil eden zaman gölge değişkeninin katsayısı da, gelişmekte olan ülkelerin yeni yüzyılla birlikte milli gelirlerinin yüzde 1,24'ünü bulan bir imalat sanayi katma-değer kaybına maruz kaldıklarını göstermektedir. Dahası reel kur ile imalat sanayinin katma-değer payı arasındaki ilişkinin doğrusal olmadığını; yerel para biriminin aşırı-değer kazandığı dönemlerde gerçekleşen kayıpların, kurun yeniden rekabetçi seviyelere gerilediği dönemlerde telafi edilemediğini ampirik olarak göstermekteyiz.

Modelimizi; reel kur endeksinin farklı ölçümleriyle, diğer sanayisizleşme ölçütleriyle, başka verisetleriyle yeniden tahmin ettiğimizde katsayıların işaretlerinin ve anlamlılık düzeylerinin değişmediğini görmekteyiz. Reel kurun politika değişkeni olmadığı yönündeki endişeleri dikkate alarak aşırı-değerlenme endeksini endojen bir açıklayıcı değişken olarak modellediğimiz dinamik panel spesifikasyonunu panel sistem/fark GMM tahmincileriyle tahmin ettiğimizde de Hollanda hastalığının varlığını tespit edebiliyoruz. Bu da elde ettiğimiz sonuçların herhangi endojenite sapmasına atfedilemeyeceğine işarettir.

Ampirik sonuçların sağlamlığını sınama çerçevesinde; gelir bölüşümündeki bozulmaların, tedarik zinciri şoklarının, kurumsal faktörlerin gelişmekte olan ülke sanayileşme patikasına etkilerini de ölçmekteyiz. 1995-2018 arası yılları ve 18 gelişmekte olan ülkeyi kapsayan bir veri setiyle imalat sanayi katma değer payı, küresel değer zincirlerine geriden katılımın göstergesi olarak mamul mal ihracatındaki yerli katma değer payı, eşitsizlik ölçütü olarak Gini katsayısı, kurumsal faktörlerin etkisini temsil eden düzenleyici kurumların niteliğini gösteren z-sayısı ve kişi başına düşen milli gelirden oluşan 5-değişkenli panel VAR modelini Arellano-Bond panel GMM tahmincisiyle tahmin ediyoruz. Modelimizin sonuçlarına göre; gelir bölüşümündeki bozulmalar veya eşitsizlik şokları mamul mallara dönük talebi düşürmekte ve sanayisizleşmeye neden olmaktadır. Düzenleyici kurumların niteliğindeki artışlar da imalat sanayinin katma-değer payına olumlu katkıda bulunmaktadır; zira ileri ve geri birçok bağa dayalı üretim gerçekleştiren imalat sanayi operasyonları sözleşmelerin tatbik edilip edilmemesinden fazlasıyla etkilenmektedir. Tedarik zincirlerindeki aksamaların gelişmekte olan ülke imalat sanayisine etkisi doğrusal olmayan bir patika çizmektedir; ithal girdi bağımlısı yerel sanayiler katma-değer zincirlerinde yaşanan kopmalar nedeniyle önce daralmakta, daha sonra ithal girdi ikamesi denilebilecek üretim kapasiteleri geliştirerek bu şokları soğurmaktadır. Yerel imalat sanayisinin küresel tedarik şoklarına karşı esnekliği göz önünde bulundurulduğunda, bilimsel esaslara dayalı bir sanayi politikasının erken sanayisizleşmenin tahrip ettiği yerli aramalı endüstrilerini yeniden canlandırabileceğine dönük umutları yeşertmektedir. Panel VAR modeli sonuçlarına dayanarak gerçekleştirdiğimiz nedensellik tahlili sonuçlarına göre, küresel değer zincirlerine geriden katılımla kurumsal faktörler arasında bir ilişki olmadığını tespit ediyoruz; bu da kurumsal iyileşmelerle katma-değer zincirlerine katılım arasında kurulan ilişkinin gelişmekte olan ülkeler bağlamında bir karşılığı bulunmadığına işaret etmektedir.

Elde ettiğimiz ampirik veriler ışığında küreselleşme kaynaklı erken sanayisizleşmeye karşı gelişmekte olan ülkelerin verili mukayeseli üstünlüklerini aşan sanayileşme politikalarını benimsemelerinin yararlı olacağını ileri sürüyoruz. Düşük katma değerli, emek yoğun faaliyetlere yoğunlaşan küresel değer zincirlerine katılımın yarattığı ithal girdi bağımlılığına karşı; devletin piyasa çarpıklıklarına doğrudan müdahale ederek bizzat öncülük ettiği, mevcut mukayeseli üstünlüklerin ötesinde yer alan teknoloji-yoğun sektörleri/faaliyetleri/ürünleri hedefleyen iddialı bir sanayi politikası izlenmelidir. Sermaye hareketlerinin reel kurlar üzerinden yerli imalat sanayisinin rekabetçiliğini tahrip etmesine karşı makroihtiyati tedbirlerle ve kurumsal reformlarla desteklenmiş sermaye kontrolleri uygulamalıdır.

1. INTRODUCTION

In this introduction, we will briefly give formal definitions for deindustrialization and premature deindustrialization by noting the global and historical trends in the world economy. We start by examining the deindustrialization process unfolding in developed countries along with its theoretical explanations. Then we plan to move on to presenting the deindustrialization in developing world taking place almost simultaneously with advanced world, and raising important theoretical issues regarding the distinctive nature of premature deindustrialization with a focus on seminal paper by Rodrik (2015).

Deindustrialization has, among other things, been a stylized fact of advanced economies for several decades, especially since the 1970s. The share of manufacturing industry in both employment and total value-added measured at current prices has been declining for almost last five decades in the developed world. The secular decline in the manufacturing sector was considered to be a main characteristic of economic growth process and has attracted great attention from many macroeconomists. To give a concise definition, we can state that deindustrialization as a concept is used to refer to the process in which employment and nominal value added share of manufacturing industry starts to decline after a certain per capita income threshold has been reached while service-related sectors tend to have a greater share in nominal GDP and employment at the expense of industry and agriculture.

All the major economies have undergone the deindustrialization process to one degree or another, while some of them such as Germany and Japan have managed to keep their manufacturing bases relatively less affected by the trends towards eroding the industry’s share in national income and employment through their large net exports in manufacture (Nickell et.al., 2008).

The deindustrialization is held to be a natural, and even positive, process for the advanced countries, indicating a high degree of maturity in their economic development. In this regard, conventional economic wisdom considers the deindustrialization process as it is experienced by major advanced economies as "a symptom of economic success" (Rowthorn and Wells, 1987: 5 – 6) in so far as this is triggered by differential productivity increases in manufacturing output.

In the neoclassical economics literature, the deindustrialization has been attributed to a relatively higher productivity growth in manufacturing output, changes in relative prices associated with that productivity growth, technology, differential factor endowments, and non-homothetic preferences in economic agents. (Rowthorn and Ramaswamy, 1999; Nickell et.al., 2008; Lawrence and Edwards, 2013)

Just as agricultural employment gradually regresses, both in absolute as well as relative terms, along with its share in nominal national income in the process of accelerated economic growth due to high productivity gains provided by the application of the fruits of industrialization to agricultural production, so manufacturing sector experiences the similar fate at the later stages of economic development since a larger output in real terms can be produced by fewer and fewer workers due to the increase in labor productivity in industry. In this sense, the manufacturing sector occupies a special place in the process of value-added creation since it has the ability to generate more productivity increases and the greater innovation capacity relative to the rest of the economy. Therefore, other sectors, especially services, technologically lag behind the manufacturing sector, leading to a greater absorption of employment in service sector and a shrinkage of manufacturing employment share. Assuming the composition of aggregate demand being fixed, differential productivity growth in favor of manufacturing sector leads to an exodus of employment from it while its share in real output can stay unchanged or even record a rise (Lawrance, R.Z., 1991; International Monetary Fund, 1997). Moreover, since services cannot keep pace with manufacturing in terms of technical progress, relative prices tend to change favoring the former at the expense of the latter, thereby diminishing the relative weight of manufacturing in the total value-added created in nominal terms over time. In sum, fast productivity gains in manufacturing sector lead to a decline in its employment and total value-added share even though manufacturing production keeps continually rising in real terms.

The share of manufacturing sector in employment and nominal value added exhibits a hump-shaped relationship with per capita income. In the initial phases of economic development, manufacturing sector commands an increasingly higher share of employment and income while agriculture loses substantial ground against manufacturing industry. At one point in this process a certain threshold of per capital incomes has been attained, and then economy starts to deindustrialize, indicating a transition into the next stage in economic development in which services sector accounts for a greater share of employment and value-added. (Ramaswamy and Rowthorn, 1997). Consequently, a decrease in the share of manufacturing in employment and output after a period of expansion can be looked upon as the outcome of a natural development process. In his original work on the inflection point of the manufacturing employment share curve, Rowthorn calculated it to be at US$12,000 using data for 1990 (Rowthorn, 1994). We should add that to their merit Rowthorn and Wells (1987) mentioned the possibility of the inflection point of their hump-shaped curves shifting down over time.

On the other hand, the dynamics functioning in the supply side of economics finds its equivalent in the demand side, making the relative decline of manufacturing in employment and output consistent with the changing pattern of aggregate consumption. There is a vast literature that treats services as "superior" goods and manufactures as "inferior" goods. As per capita income rises, then Engel's law starts to assert itself and there arises a shift in the composition of aggregate consumption, increasing the relative demand for services and hence the share of expenditure devoted to them (Clark, 1957). In other words, nonlinear Engel curves explain the relative increase in the services at the expense of manufactures in a dynamic setting. Hence, manufacturing output expands at a slower rate and services constitute a higher share of total aggregate demand due to the non-homothetic preferences.

This standard narrative which places an emphasis upon "internal factors" has received a great deal of criticism for not taking the "trade between North and South" into account. To consider the effect of the North-South trade on the manufacturing value added and employment share in advanced economies, the Stolper-Samuelson model has been evoked. (Saeger, 1997; Komiya, 1967; Hazari et. al., 1981) With the elimination of trade barriers between developed and developing countries, the price of low-skilled labour-intensive goods start to decline and low-skilled labour-intensive manufacturing sector undergoes a contraction process in advanced countries because these sub-sectors cannot stand up to the competition coming from developing world where unskilled labor is abundant and thus cheaper. The workers thus released will seek to find employment in nontradable sector, thereby giving rise to deindustrialization. The other channel through which the North-South trade works out its impact upon deindustrialization process undergoing in the advanced countries is the outsourcing of unskilled labor-intensive jobs to the developing countries where labor is abundant and cheap. Sachs and Shatz (1995) developed a model in which both wages for unskilled labor and manufacturing employment decline in advanced countries as the limitations on capital mobility are gradually eased in developing countries so the capital advanced in the unskilled labor-intensive production in the North can relocate into the South (Sachs, and Shatz, 1995). In this model, the decline in the wage of unskilled labor in the North is not associated with a relative fall in the unskilled-intensive production as predicted by Stolper-Samuelson theorem. The result is that the capital in the North takes advantage of global labor arbitrage in the unskilled production and flows into the South, and the unskilled labor in the North seeks to find employment in nontradable sector, leading to a decline both in production and employment in the manufacturing sector in the North.

As a result, deindustrialization process in the advanced countries raised concerns among some quarters. The decreasing share of industry in employment has been associated with the major loss of good quality jobs, and the removal of the main channel through which dynamic productivity gains have been obtained. Combined with the financialization, deindustrialization is also deemed to contribute to widening income inequality.

Although deindustrialization is usually associated with the experience of developed economies, a less noticed pattern has emerged among some developing countries. While some Asian countries such as China and Taiwan have made great leaps in industrial production filling the vacuum left by deindustrialization process in developed countries, the bulk of developing economies in sub-Saharan Africa and Latin America has undergone what might be called a premature deindustrialization (Dasgupta and Singh, 2006). In other words, the share of manufacturing in total value added and employment has witnessed a general reduction across the developing world except the newly industrializing East Asian countries.

While it seems natural to see a fall in the share of manufacturing along the development path, deindustrialization experienced by some developing countries took place at a relatively low per capita income levels compared to early industrializers. In this regard, deindustrialization kicks in at a low per capita income level in recent periods so that developing countries with little manufacturing base starts to deindustrialize before passing through a proper industrialization process.

Premature deindustrialization can be best described as follows: when we put the per capita income on horizontal axis and share of manufacturing in employment and nominal value added on vertical axis, the inverse U-shaped curve has shifted downward, and possibly more and more leftward towards the origin over time since 1980s (Rodrik, 2015). That is, developing countries see a declining share of manufacturing value added and employment at a per capita income level significantly lower than that of advanced countries when they have started to deindustrialize.

What is striking about premature deindustrialization is that the theoretical framework which has been developed to explain the advanced country case falls short of shedding light on the deindustrialization process unfolding at a relatively low per capital income level. Explanations such as differential productivity growth and non-homothetic consumer preferences fail to wholly and convincingly explain the substantial structural change gripping the developing world since 1980s.

In this regard, Rodrik's seminal paper on premature deindustrialization provides a substantial insight into the dynamics behind the loss in manufacturing share at low income levels. For one thing, the falling share of manufactures in nominal income in the case of most of emerging market economies cannot be ascribed to the technical progress differential in favor of that sector because almost of them are classified as small countries whose supplies make up a tiny share of world output. Any increase in the relative price of manufactures in the world market has the same effect on manufacturing employment share as technological innovations in manufacturing because price changes should be treated parametrically in small-developing countries. In contrast to the case of developed countries, technical progress in manufacturing has a favorable effect on employment share of manufacturing industry. The favorable effect of technological advances on manufacturing employment in developing countries applies regardless of the magnitude of price-elasticity of demand for manufactures, which contributes to deindustrialization in developed countries very much. Therefore we can safely claim that most of developing countries experiencing a premature deindustrialization operate as price-takers in manufactures, a fact which invalidates any explanation based on technological factors.

With globalization progressing, developing countries have become more and more susceptible to relative price tendencies originated in advanced countries whose manufacturing output account for a considerable share of global production and which can be regarded as price-setters in manufactures. With each technical progress in manufactures in developed countries translating into a lower relative prices of them, developing countries "import" deindustrialization as defined by the share of manufacturing sector in nominal value added. Moreover, developing countries need to achieve more rapid productivity growth in manufacturing so as to avoid deindustrializing in nominal value added terms just because relative price trends work in favor of premature deindustrialization. Hence the fall in relative prices of manufacturing goods needs to be more than offset by labour productivity growth in manufacture for developing countries to industrialize. (Rodrik, 2015)

Rodrik's proposition that the deindustrialization process developing world has been experiencing for last decades might be associated with trade liberalization is ground-breaking in many ways. It is interesting to note that the premature deindustrialization has coincided with the dismantling of import-substitution industrialization policies and the beginning of strategic choices toward the opening-up of trade with advanced industrial economies. With the protective walls of tariffs and customs destroyed, developing countries with little manufacturing base have started to rapidly deindustrialize due to the competition coming from imports. Here trade liberalization plays a great role in weakening local manufacturing industry and driving less efficient local producers out of business. On the other hand, the end of import substitution strategies drove policy-makers to adopt a new policy framework encouraging private capital formation and foreign direct investments while reducing public sector investments in manufacturing industry. But the retreat of public sector from industrial investments has tended to lower the gross capital formation as a share of national income in developing countries because private investments and FDIs failed to make up for the loss of investments originating in withdrawal of public sector from industry (Palma, 2010).

In this regard, Dani Rodrik's findings are particularly illuminating. He splits developing countries up into two sub-categories; first, manufactures exporters whose manufacture share in total exports exceeds 75 percent and whose manufacture share in total exports exceed the corresponding share in imports; second, non-manufactures exporters whose manufacture share in total exports is below 75 percent and whose manufacture share in total imports exceed the corresponding share in exports. Countries regarded as having strong comparative advantage in manufactures have been capable of avoiding losses in real manufacturing while those developing countries with little-to-none base in manufactures when they implemented the trade liberalization policies have borne the brunt of globalization in terms of real manufacturing value added and employment. (Rodrik, 2015)

To escape from the ordeal of deindustrialization, the developing countries with weak manufacturing base must raise their labor productivity such an extent that they should be able to compensate the unfavorable price trends they imported from technologically frontier countries. But in a globalizing world, there will be an increasingly smaller scope for achieving the needed technical progress in developing countries. With the creation of global value chains, most developing countries ended up finding themselves at the bottom of GVCs where a few backward and forward linkages can be established (UNCTAD, 2018). Therefore many developing countries engage in the low value added activities and are unable to move up the value chain. By taking part in GVCs, they specialize in manufacturing production with narrow technological base, which hinders the large productivity gains needed. Worse, it gets increasingly difficult for developing countries to even participate in GVCs due to the recent technological trends which are unskilled labor augmenting in nature and make the elasticity of substitution lower toward zero. (Rodrik, 2018).

In addition to trade liberalization, financial globalization has dealt another blow at developing country industries. With the deregulation of capital accounts across the world, many developing countries which recurrently suffered from debt crisis implemented disinflation policies with relatively high interest rates as a recipe for recovery under the guidance of international institutions such as IMF and World Bank. These policies provide lucrative opportunities for short-term financial capital, resulting in huge inflows of capital into developing countries in the form of portfolio investments and short-term credits. Real exchange rate appreciation following colossal amounts of capital inflows puts a downward pressure on the competitiveness and profitability of manufacturing industries in developing countries.

Hence, the globalization with all its dimensions in trade and finance is to blame for premature deindustrialization.

2. EMPIRICAL LITERATURE AND DESCRIPTIVE STATISTICAL ANALYSIS ON PREMATURE DEINDUSTRIALIZATION

In this chapter, we will present empirical evidence for deindustrialization process ongoing in developing countries by putting it in cross-region/country and historical perspective. First, we will go over the empirical literature on premature deindustrialization to document deindustrialization tendencies occurring at low per capita income levels. Then, we will present the available data to detect cross-region/country trends in the manufacturing share of total value-added created and the employment share of industry over time with a particular emphasis on developing countries. For robustness against any sample bias in our statistical description, we will tap into three different database sources, namely GGDC Sector Database; World Bank, World Development Indicators; UN DESA, Statistics Division, National Accounts Main Aggregates database. We will point out in passing to some potential candidates for an explanation of the premature deindustrialization by conducting a descriptive statistical analysis.

Rodrik in his seminal paper (2015) runs two way fixed effect panel data regressions for manufacturing share in total value added in nominal and real terms as well as for manufacturing employment share. In this setting the time dummies for the 1960s, 1970s, 1980s, 1990s, and post 2000 capture the decline in the peak share of manufacturing sector with the pre-1960 years being benchmarked for historical comparison while the country fixed effects account for any country-specific factors such as geography, factor endowments, history. The fixed time effects are constructed to reflect the shocks in any time period affecting each country in the same way. His findings are particularly striking. In 2000s, average country in his common sample of 42 countries including both developed and developing regions suffers a loss of 11.7 and 8.5 percentage points in the share of manufacturing in employment and nominal GDP respectively compared to the 1950s. The decrease in manufacturing value added share measured at constant prices seems relatively small but it still stands at 3.5

percentage points lower in the post-2000 period than in the pre-1960 period. Rodrik concludes that the pace of deindustrialization has gotten faster in recent periods. Moreover, deindustrialization now is not confined to advanced countries which have already passed through a somewhat complete industrialization phase before. Some developing regions such as Latin America and Sub-Saharan Africa excluding Mauritius have also been hit hardest by the declining share of manufacturing in employment and real GDP over time while East Asian countries seems largely unaffected by these trends. In general, the deindustrialization process not only gets more rapid but also asserts itself at lower per capita income over time. Rodrik compares Western European countries such as Britain, Sweden and Italy which reached their peak share of manufacturing employment at a level of per capital income of $14,000 in 1990 dollars while India and many sub-Saharan African countries see their manufacturing jobs in relative terms melt away at a per capita income of only $700. His baseline regressions are compatible with these observations. The maximum share of manufacturing employment was 21.5% and was achieved at a GDP per capita of $11,048 in international 1990 dollars in pre-1990 period. The figures were down to 18.9% and $4,273 in the post-1990 period, respectively. This also is the case for manufacturing share in real GDP. After 1990, the maximum share declined from 27.9% to 24.1% and the turning points in terms of per capita income fell from $47,099 to $20,537.

Timmer, et al (2014) provide an empirically strong case for premature deindustrialization in developing world except the East Asian countries. They noted that after an expansion period from 1960 through the mid-1970, the relative share of manufacturing in GDP began to fall in most Latin American and African countries and most African countries did not see their manufacturing sector reach similar levels in GDP and employment attained in Latin America and Asia. They also draw attention to the fact that the employment and output share the manufacturing industry had lost in Latin American and African countries has been captured by their services sectors. Therefore, they establish that there has been a correspondence between the decline in manufacturing share and a rise in services share in aggregate output and labor force in those countries since the mid-1970s.

In their pioneering work on the subject in which they coined the "premature deindustrialization" term, Dasgupta and Singh (2006) observed that in Latin America, the GDP growth has exceeded that of manufacturing for the period 1970-2003 while services has performed over and above the rise in national income. As a result, the change in the composition of GDP eroded the share of manufacturing industry while the services picked up the slack. These developing countries leapt into becoming an increasingly services economy while skipping the stage of thorough industrialization. Despite the recent evidence that employment deindustrialization in Africa may have halted or even reversed after the early 2000s, offering a glimmer of hope for “manufacturing renaissance” (Kruse, et.al. 2021), the increase in manufacturing employment seems to have mostly come from small, informal enterprises exhibiting stagnant productivity growth (Diao et al. 2021; Diao et al. 2017).

Trade and Development Report (2016), prepared by UNCTAD economists, also dwelled extensively on issues of catch-up industrialization, stalled industrialization, and premature deindustrialization and devoted a whole chapter to the problems of industrialization faced by newly industrializing countries in the developing world. The report adopted a granular approach to find out the deindustrialization unfolding in low income countries by examining different developing regions separately. The falling share of manufacturing in Southern Cone where countries such as Argentine, Chile, and Uruguay are located and North African countries stands out in particular. Argentine, Brazil and Chile made significant gains in their bid to industrialize since the 1930s and 1940s, bearing their fruits in the first half of 1970s where manufacturing sector constituted 34, 31, and 20 per cent of total value added respectively. But these gains seem to have disappeared in the 2010-2014 period with respective shares dropping to 17, 13, and 12 per cent. Countries in North Africa and transition economies in East Europe shared the same fate as Southern Cone countries. The case of sub-Saharan countries is even bleaker (Gollin et al., 2013). They started to build up a domestic industry almost from scratch and succeeded in creating a productive capacity in their accelerated growth period between early 1960s and the mid-1970s. In this period, their industry even recorded higher growth rates than those in the industrialized world, thereby closing the gap between them. But this period of convergence in terms of industrial production came to a halt after 1975, starting with the implementation of structural adjustment policies across many countries in the region. UNCTAD (2016) specifically singled out the story of Botswana to characterize the poor initial conditions of African countries in their industrialization efforts. The country expended enormous resources on creating a domestic industrial base by achieving a stunning average annual growth rate of 11 percent in real terms between 1964 and 2014 but its initial conditions were so poor that even these fierce efforts at industrialization yielded quite a modest result with the manufacturing share being still below 7 per cent of its GDP as of 2014. If we turn back to the region as a whole, the main culprit behind the failure of industrialization seems to be liberal reforms carried out during the 1970s according to UNCTAD (2016). With local industries unable to stand up to competition coming from imports and to create resources to keep their industrialization drive going forward, the share of industry in total value added declined to single-digit levels during the 2010s after turning its peak share of 30 per cent in 1980. The employment share of industry fared even worse than its value-added share. It never went above 10 per cent in the post 1970 period, only to reach 12 percent in the 2010s.

Palma (2014) presents another extensive document of employment and value-added deindustrialization in developing countries in addition to providing important insights into its economic and political dynamics. According to his calculations, in sub-Saharan Africa, the share of manufacturing employment has fallen from 6,2% in 1980 to 5,5% in 1990 and kept persistently remaining unchanged at this low level through 2003. The South Africa also saw a drastic decline in its manufacturing employment share from 18,2% in 1980 to 14,1% in 2003. In Southern Cone and Brazil, it declined from 17,9% in 1990 to 13,1% in 2003. Also newly industrializing countries excluding China exhibited deindustrialization in employment by falling from 28,7% in 1990 to 19,4% in 2003. When it comes to the share of manufacturing value added, he detects a similar trajectory. It declined from 17,4% and 25,5% in 1980 to 13,8% and 18,1% in 2003 in sub-Saharan Africa and South Africa respectively. In Southern Cone and Brazil, it fell from 31,7% in 1980 to 16,9% in 2003 as well. Newly industrializing countries excluding China were not an exception to these trends, either. Their manufacturing value added share decreased from 27,1% in 1980 to 24,9% in 2003. The more grim fact underlined by Palma is that in sub-Saharan African, former Soviet Union and Eastern European countries deindustrialization has been associated with a falling per capita income level.

Palma also suggests that a kind of Dutch disease different from its traditional meaning might be unfolding in some developing countries seeing their industrial share go down. According to this definition, the Dutch disease should not be confined to its narrow meaning that real exchange rates appreciate following natural resource discoveries. He raises the possibility that the Dutch disease might result from flourishing service-exporting sectors such as tourism and financial services. More specifically, the so-called Dutch disease may assert itself after drastic changes in economic policy as has been the case in Latin America and Africa. According to Palma, Dutch disease was experienced after 1980 in Latin America and South Africa as a result of the end of import-substitution industrialization policies. Trade liberalization and lower tariff rates led to a decline in the price of tradable goods while financial liberalization gave rise to a surge in capital inflows overvaluing the real exchange rates. On top of that, the termination of institutional support for manufacturing industry and the productivity increases due to imported capital goods also contributed to deindustrialization.

After these explanations, Palma moves on to classifying developing countries into two categories, namely, "trade-surplus-in-manufacturing" (mf) and "trade-surplus-in-primary-commodity-or-services" (pc) countries. If a country's status underwent a change from mf to pc, it exhibits a "specific additional degree of de-industrialization", that is, deindustrialization takes place at a greater degree than would have been expected given the usual sources of deindustrialization as discussed in the introduction. Palma specifically singles out Argentine, Brazil, Chile, Uruguay, and South Africa as examples of those developing countries fallen victim to a sort of Dutch disease. Their employment structure has been transformed from import-substitution industrialization policy-induced mf to resource-rich pc. These countries sustained a heavier deindustrialization than would be justified by their fundamentals. Palma unequivocally puts the blame on the policies aimed at dismantling the import-substituting industrialization and transitioning into trade and financial liberalization.

In their research on premature deindustrialization in Latin America, Castillo and Neto (2016) claim that since the mid-1990s, the share of services in total value-added and employment has risen at the expense of industry for Brazil, Argentine, and Chile. The highest share manufacturing sector has attained in these countries is also far lower than that enjoyed by today's industrialized countries. Moreover, developed countries such as Great Britain, Denmark, Japan, USA, Korea, France and Spain entered the deindustrialization process at a per capita income of US$10,000-15,000, while Argentine reached its highest industry share at a per capita income of US$5,461, Brazil at US$5,202, Chile at US$4,392, Mexico at US$7,275. They also provide an additional evidence by running the Rowthorn-type regression (Rowthorn, 1994). The regression of manufacturing employment share on per capita income at 2005 PPP international dollars using a sample of 100 countries yields a U-shaped curve with an inflection point at international $15,000. Most Latin American and African countries are placed below that U-shaped curve, suggesting that their manufacturing share is lower than would be indicated by their per capita income. In other words, with the given per capita income level of their own, their manufacturing industry should have reached at a higher employment share but has not.

Amirapu and Subramanian (2015) plot the employment share of industry against per capita income as measured by PPP dollars for all countries for which data are available in the World Bank's World Development Indicators and three different points in time, in 1988, 2000, and 2010. They deliberately exclude oil exporting countries from their dataset since they are supposed to take care of themselves. What comes out is inverted U-shape curves shifting down and leftwards over time. The curves they found imply that the highest share industrial sector could grab from total employment declines and per capita income level at which deindustrialization takes hold falls with each passing point in time. As time goes on, an average country specializes less and less in industrial sector by allocating fewer labor force into it as suggested by shifting-downs and that country also quickly enters into that stage of economic development in which services sector becomes more important than industry. According to their calculations, the maximum share of manufacturing employment was 30.5% in 1988 and the associated income level was $21,700. They declined by nearly a third to 21% and by approximately 45% to $12,200 in 2010, respectively.

Felipe et al. (2019) draws a dismal picture for late industrializing countries. According to the panel data regressions, they find that today's late industrializing countries are highly unlikely to achieve a manufacturing employment share of 18%, a share that all rich countries in their sample have already attained. Countries with poor initial conditions and/or growing at a snail's pace are at a double disadvantage in the sense that they are expected to deindustrialize at a lower income level and a smaller peak share of manufacturing employment than are the rich countries. Hence, the chances of being an industrialized country for many developing countries gets slimmer the later they embark on industrialization path.

After the review of empirical literature on premature deindustrialization, we are ready to show what is actually taking place in developing countries and regions by tables and figures.

First, we would like to bring the value-added and employment share of manufacturing industry vis-a-vis other sectors over time for several geographic regions into the discussion. In doing so, we will be able to easily detect the overall evolution of the composition of output and jobs over time and across both developed and developing regions (Appendix A, Table A1).

We may largely categorize sub-Saharan Africa, Latin America, Middle East and North Africa as developing regions while North America and Europe can be considered as developed. Asia as a region stands out as a mixed sample of countries since it accommodates such high per capita income countries as Japan, Hong Kong, Republic of Kore, Singapore, and Taiwan alongside developing countries like China, India, Indonesia, Malaysia, Philippines, and Thailand.

The general trend all over the developing world is that manufacturing industry gain in relative output share first during the period between 1960 and 1975, but then it went into a long period of steady decline thereafter. The success achieved in terms of an expanding manufacturing sector may mainly be attributed to the import substituting policies implemented throughout Latin America, sub-Saharan Africa, and Middle East and North Africa in the 1960s and early 1970s. Some Asian countries such as Republic of Korea, India, Malaysia, and Indonesia also pursued similar policies back then. And this period exhibits many characteristics common to catch-up industrialization in which manufacturing sector with its high productivity growth enlarges its value-added share at the expense of relatively low productivity sectors like agriculture. But at the cost of spoiling this success story a bit we should add that sub-Sahara, Latin America and Middle East and North Africa as a whole never saw their manufacturing sector as percentage of total value-added achieve the levels observed in developed regions such as North America and Europe even in their heydays. Therefore, given the sample period ranging from 1960 through 2010, the peak share of manufacturing output in the developing world was quite below that in the developed regions.

With the start of market-friendly reforms in line with the demands of globalization, this catch-up industrialization came to a halt. After 1975, the developing regions started to deindustrialize across the board while their agriculture has continued its free fall. What comes out is the pattern where the composition of output has changed heavily in favor of services like finance, insurance and real estate sector (FIRE). This is quite intriguing because North America and Europe lost a vast amount of manufacturing value added and saw its FIRE sector explode especially after 1975. In this sense, it can be said that with the globalization kicked off there has been a great convergence between developing and developed regions not in terms of per capita income but in terms of economic structure.

Now we want to underline the two facts affecting developing world. First, developing regions never attained as high a manufacturing output share as developed countries had done. Second, unlike the case with developed country examples, deindustrialization gripping developing world after 1990 took place at relatively low or middle income levels. These two facts combined can be taken as a sign of premature deindustrialization.

In sub-Saharan Africa, as things stand in 2010, manufacturing industry seems to have lost what it has achieved in the 1960s and early 1970s. The output share of manufacturing industry has grown by more than 50% from 9.2% in 1960 to 14.6% in 1975. After then, manufacturing output share declined continually so that in 2010 the region turned to the level it was in 1960 in terms of manufacturing value-added share. On the other hand, mining and services like trade, restaurants, and hotels and finance, insurance, real estate and business services recorded a rise in their output share after 1975. In sum, primary commodity production and services has grown at the expense of manufacturing and agriculture for sub-Saharan Africa after the turning point of 1975.

Latin America followed a similar trajectory to that of sub-Saharan Africa when it comes to its manufacturing output share. It first rose from 18.1% up to 22.3% between 1960 and 1990, and then declined at such a high rate that in 2010 it was below its 1960 level. The favorable impact of rising commodity prices has been felt in the mining sector in the 2000s. Fueled by the commodity boom, the mining sector almost doubled its output share in the 2000s. The share of agriculture in total value-added went down throughout the whole sample period. With the pace of globalization quickening after 1990, most services like FIRE, construction, transportation and so on, has expanded its output share.

After entering a similar period of catch-up industrialization between 1960 and 1990, Asia has kept its manufacturing output share to great extent during the period hallmarked by rapid globalization. Before experiencing a slight decline during the 2000s, the relative share of manufacturing output was as high as 26.8% in 1990, a rate no other developing region has ever attained.

The developed regions like North America and Europe also underwent a deep structural transformation in this period. The steep decline in their manufacturing output share was almost matched by an explosion in services like finance, insurance, and real estate, indicating a transition into what many economists called as post-industrial society in which expansion in services like financial sector went hand in hand with deindustrialization at relatively high income levels.

When looked at the employment share of sectors over time, the same trends we have observed in the distribution of value-added share across different activities become only starker (Appendix A, Table A2).

The first thing which strikes out is that the employment share of manufacturing industry has never been as high in sub-Saharan Africa, Latin America, Middle East and North Africa, and Asia as it was in Europe and North America in 1960.

If we start with employment structure of developed regions, North America and Europe experience the same radical transformation as we have seen in their output composition. Manufacturing in advanced countries has shed a vast amount of labor-force share while people found employment more and more in services sector the most outstanding one of which is finance, insurance, and real estate sector that has tripled its 1975 level in North America and almost doubled in Europe.

In sub-Saharan Africa, the employment share of manufacturing industry has recorded modest rise since 1960 but never saw two-digit numbers by 2010, an indication of anemic industrialization. However much employment share agriculture has lost since 1960, it still commands nearly half the total labor force by 2010. It seems that the labor force released from agriculture sector found employment in services sector in general rather than manufacturing industry. The labor has directly moved from agriculture to services without passing through any proper employment industrialization as suggested by a single digit number of manufacturing employment share. For example, the employment share of trade, restaurants, and hotels sector was approximately two and half times as large in 2010 as it had been in 1960 and it was two times greater than manufacturing employment share.

Latin America underwent an employment deindustrialization after 1975 with manufacturing industry losing a quarter of its employment share. The labor-force set free by agriculture and manufacturing has been employed in services sector to a great extent. Between 1975 and 2010 trade, restaurant, and hotels sector almost increased its employment share by more than 50%, while finance, insurance, real estate and business services sector more than tripled its own share in the same period. One thing to note is that commodity boom during the 2000s is hardly reflected in the employment share of mining sector which records only a modest rise in contrast to its nearly doubling output share. All in all, we can state that both sub-Sahara and Latin America turns increasingly into a services economy without becoming an industrial economy first.

Compared to the rest of world, Asia fared better as indicated by its higher manufacturing employment share in 2010 even though it also lost more than a fifth on that score. In line with the trends all over the globe, services sector made important gains in its employment share in Asia as well. For example, finance, insurance, and real estate sector has double its employment share but it was still at single digit numbers by 2010.

Middle East and North Africa could not escape employment deindustrialization after 1990 either but the region saw a construction boom which has doubled the sector's employment share since 1975. The region experienced a decline in the employment share of mining sector in the 2000s despite the commodity boom.

The examination of the trends affecting employment and value-added shares of sectors from cross-regional perspective shows us that the rise of services sector accompanied by a relative decline in the manufacturing industry (except the Asia) in the aftermath of globalization era is not a peculiar developed country case but is a widespread phenomenon across the developing world (except some Asian late industrializers). In other words, deindustrialization set in motion by globalization caught most developing countries half way through their industrialization. For most of them, industrialization has remained an unfinished project.

These trends are robust to dataset and samples. The change in the composition of output and employment is mostly to due to the excess growth rate of some sectors over the gross domestic product growth rate. Once we subtract the average annual growth rate of gross domestic product from that of a sector, we will then be able to trace out the path of economic activities over time. In this analysis, differential growth rate of a sector versus GDP can be used as a proxy for how its share in value-added creation has evolved. If a sector grows at a higher rate than overall growth rate throughout a time period, then this sector will have accounted for a greater share of economy at the end of it, and vice versa.

Below we will search for the trends described above by using the data published by the United Nations. Along with the dataset, the samples will change accordingly. Here all regions except the Northern America, Northern Europe and Western Europe can be regarded as regions populated by developing countries.

The growth performance of manufacturing relative to overall economic growth runs deficit for most of the regions the only exception of which is the West Asia where manufacturing sector has kept consistently growing in excess of GDP for last 4 decades even though its pace has considerably slowed down with the 1990s (Appendix A, Table A3.a). Eastern Asia also seems to be one of the winners in the globalization era as indicated by its excess growth of manufacturing over GDP being very close to 8% in the 2000s even though in the next period 2010-2018 the effects of Great Financial crisis has been felt there. In Latin America and the Caribbean, the GDP growth exceeded that of manufacturing since 1980, corroborating our observation that the region has fallen victim to premature deindustrialization. After three consecutive decades of growth deficits beginning with the 1980s, sub-Saharan Africa, another premature deindustrializing region, has slightly recovered its manufacturing sector between 2010 and 2018. Northern Africa could manage to expand its manufacturing sector during the 1980s, only to see its excess growth rate first decline in the 1990s and turn into a deficit in the 2000s followed by a meagre excess growth again in the period 2010-18. Therefore manufacturing sector has recorded either a sluggish growth performance or even lagged behind versus GDP across the whole developing regions with some exceptions. Deindustrialization has been a generic feature of developed regions though sometimes one region may have sporadically shown an excess growth of manufacturing above GDP growth.

The agriculture seems to be the other loser sector after globalization era (Appendix A, Table A3.b). Except Northern Africa and sub-Saharan Africa, agriculture sector has not in general held its own ground for all regions in all times. Hence the decline in the relative share of agriculture combined together with the similar trend in manufacturing sector has been a harbinger for the rise of services sector.

Services sector is one obvious winner of globalization era in contrast to agriculture and manufacturing (Appendix A, Tables A3.c-e). Services such as wholesale and retail trade, restaurants, and hotels; transport, storage, and communication; other activities recorded excess growth over GDP for all regions except the East Asia for most of the sample period. The growth deficit both manufacturing and agriculture has run against GDP paves the way for excess growth of services, indicating the transition of both developed and developing regions alike into a services economy except East Asia.

Now we take a step further and adopt a more granular approach for comparing the excess growth of manufacturing or services over GDP growth across selected developing countries (Appendix A, Table A4). Here we used the World Bank, World Development Indicators database.

The country level analysis sheds more light on what is actually happening in the developing world. With the end of developmental state policies like import-substitution industrialization since 1975, in most Latin American countries GDP growth is above the manufacturing sector growth and below the services sector growth. Even countries with significant manufacturing capabilities like Mexico, Brazil, Argentine, Peru, Bolivia, Colombia and Chile has run growth deficit in manufacturing against GDP after 1975. It is no surprise that in the countries where manufacturing growth was less than GDP growth, services sector has shown strong growth performance over GDP, thus taking the place of manufacturing as a source of value-added creation. As a result, the GDP growth has become ever more dependent on services sector for most Latin American countries.

African countries have not been immune to this tendency for manufacturing to run growth deficit against GDP even though they did not have much industrial base, which should, under normal conditions, facilitate higher growth rates for manufacturing sector. Even Mauritius, the most industrialized country in Africa, and South Africa, the most advanced saw its GDP growth exceed that of manufacturing since 2000.

Services sector has shown stronger growth performance than both GDP and manufacturing in Kenya, Nigeria, and Zambia while Ghana, Senegal, and Botswana can also be designated as other premature deindustrializers in Africa.

What is interesting to see is what we could not see when we lumped together countries in the case of East Asia. East Asia has so far been defined as the only exception in the developing world which has not suffered from premature deindustrialization. But the country level analysis shows us that premature deindustrialization may have taken hold in some east Asian countries such as Malaysia, Indonesia, and Philippines with ever declining manufacturing growth rates versus GDP while the services sector getting the upper hand in the latter two. In India, despite all efforts spent by one government after another, the excess growth of manufacturing over GDP has always been lackluster for last six decades, a sign of industrialization at a snail's pace.

Let's conclude the documentation of premature deindustrialization by the figure below. Inspired by the work of Amirapu and Subramanian (2015), we plot the employment share of industry against GDP per capita measured in terms of current purchasing power parity international dollars. The sample includes all the countries whose data are available at the World Bank, World Development Indicators database. Since the World Bank does not publish data about the share of manufacturing in total employment, we had to use the employment share of industry which consists of manufacturing, mining and quarrying, construction, and public utilities such as electricity, gas, and water. Here we report the inverted U-shaped curves about the relationship between industry's employment share and the level of economic development for three points in time, the year 1991, 2000, and 2019. For this reason, the countries vary across samples (Figure 2.1). We also attach the table summarizing the information about the peak employment share of industry and the associated per capita income level for a typical country at three different points in time (Table 2.1).

Table 2. 1 : Industry peak shares and inflection points over time.

	1991	2000	2019
per capita income (international $PPP	37112	26007	22518
peak share(%)	29.62	25.95	22.65

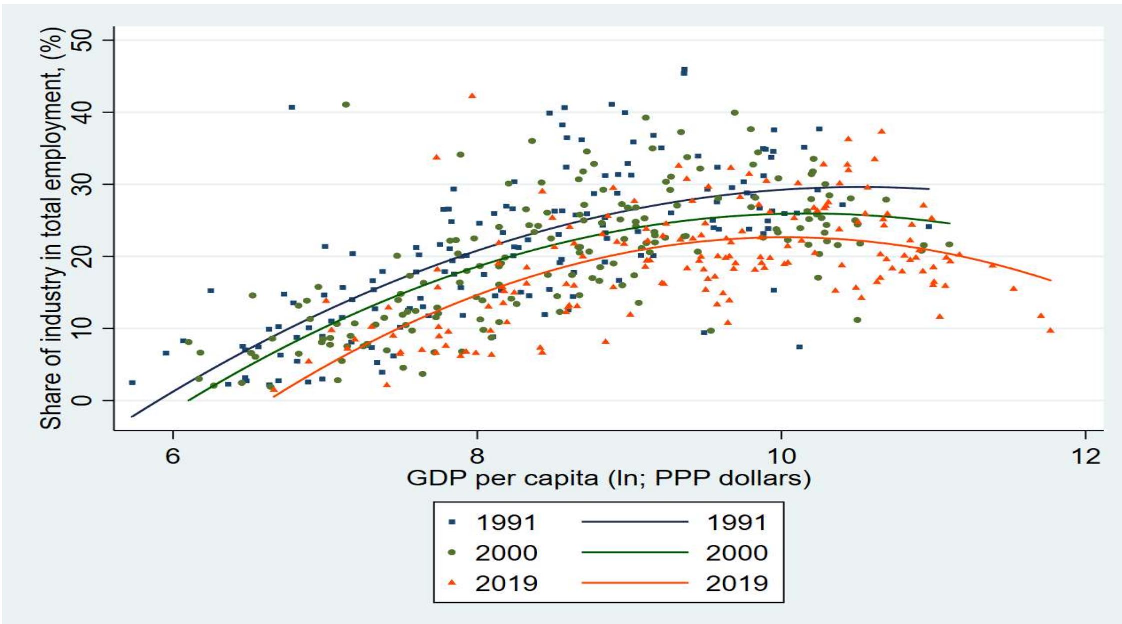

Figure 2. 1: Deindustrialization over time.

In line with the literature, the employment share of industry is non-linearly associated with per capita income level as suggested by quadratic formula. The hump-shaped curve between industry's employment share and income level can be read as follows: As a typical country embarks upon economic development path, its industry accounts for an increasingly higher share of total employment until it reaches its peak share as shown by the inflection point of the curve, and thereafter the country starts to deindustrialize as it moves further along the development path. In sum, as the economic development runs its course, an average country first industrializes, and then deindustrializes as a matter of course. Hence, the deindustrialization associated with the so-called inverted U-shaped curve can be interpreted as a sign of economic maturity.

But there is more to the figure. The relationship between industrialization and economic development cannot wholly be captured by a single inverted U-shaped curve because these curves have also shifted downward and leftward over time. The curves shifting down as time went on imply that the highest share industrial sector can grab from total employment declines for an average country in the dataset with each passing time period. The curves shifting leftward over time suggest that the per capita income at which a typical country in the sample starts to deindustrialize falls with each passing time period. Hence the deindustrialization associated with the shifts in the inverted U-shaped curves can be regarded as a sign of premature deindustrialization.

To put these words in numbers, a typical country in 1991 achieves a maximum manufacturing employment share of 29.6% at a per capita income of I$ 37112. Ten years later, the peak share of manufacturing employment declines to 25.9% and could be attained at a per capita income of I$ 26,007 on average. By 2019, the maximum employment share of an average country's industrial sector falls further into 22.6% and the income level associated with it also decreases to I$ 22,518. The peak share of industry has dropped by nearly a quarter, and the income level associated with industrialization at its highest has went down by 30% from 1991 to 2019. To put it in simple English, deindustrialization occurs faster and earlier along the development path over time.

In addition to simply describing the premature deindustrialization, the empirical evidence we bring forth here serves also the purpose of distinguishing premature deindustrialization from what may be called as "mature" deindustrialization.

Before concluding this chapter we should address the question of whether premature deindustrialization we have documented so extensively is a mere statistical artifice due to the contracting out of services within manufacturing firms to specialist firms providing them. Is premature deindustrialization simply a statistical illusion which arises from counting as services what was classified under manufacturing value-added beforehand? To put it more blatantly, is premature deindustrialization notional or real?

It is a well-known fact that some of the activities which were earlier classified as manufacturing are now regarded as "services" because manufacturing firms find it more profitable to contract out certain services activities to specialized services firms than to supply them by their means. This is what Bhagwati (1984) called as splintering effect. To cite a few examples, industrial firms used to do their legal, accounting and research and development works on their own but they are now largely delegated to services firms specialized in these activities. Neyyar et al. (2018) flatly reject the idea that the splintering effect may explain the premature deindustrialization. According to their calculations, the annual value-added growth of services sector due to the splintering effect has been less than or at most equal to 10% between 2000-2014 for selected developing countries such as Brazil, China, India, Indonesia, Russia, and Mexico. In other words, the splintering effect explains little to nothing when it comes to the premature industrialization.

But what explains it? This is the question we will tackle in the next chapter.

3. THEORETICAL FRAMEWORK FOR EXPLAINING THE PREMATURE DEINDUSTRIALIZATION: THEORETICAL LITERATURE

After empirically showing the deindustrialization process affecting developing world, we are now ready to set out to analyze the determinants of premature deindustrialization from a theoretical point of view. We will deal with a whole set of theoretical approaches to the issues associated with (premature) deindustrialization by splitting them up into two categories, namely, explanations based on the peculiarities of globalization and those based on consumer preferences. While the latter puts emphasis on nonhomothetic preferences and nonlinear Engel curves in explaining the change in the composition of aggregate demand and output, the former singles out the globalization as a main catalyst for deindustrialization.

The explanations based on globalization basically point out that deindustrialization went in sync with globalization to a great extent. Therefore, since the fact that both deindustrialization and globalization have almost simultaneously taken place cannot be simply ruled out as a purely coincidence, their starting point is to discover the ways deindustrialization, especially widespread in some developing countries, might be related to globalization. Namely, this chain of thought suggests that revolutions in information and communication technologies accompanied by a radical transformation in production on a global scale and an improvement in the productivity of labor applied to manufacturing, and radical policy choices associated with globalization in regard to trade regime and capital account might have played a role in driving many countries both developed and developing alike into deindustrialization. Hence, the globalization is the main culprit behind deindustrialization process.

By claiming that supply side approaches fall short of explaining the deindustrialization process due to their over-reliance on differential productivity growth between manufacturing and services, explanations based on consumer preferences adopt more of a demand side approach by linking the dynamics behind the deindustrialization to changes in the composition of aggregate demand along the development path. According to this line of reasoning, as an economy moves further along its development path, it starts to treat manufactures it once saw as “superior” good as inferior to services which get assigned higher value by its participants. The explanation based on the change in the composition of aggregate demand, it is claimed, can avoid many pitfalls the supply-side approaches blissfully ignored.

We will start with the examination of the relationship between premature deindustrialization and globalization with all its ramifications in both trade and finance. Then we will go through the demand side approaches by discussing their main merits and deficiencies.

3.1 Trade Globalization

One of the most outstanding feature of recent era has been tremendous changes in global trade and capital flows. In a sense, globalization is about a greater integration among countries as shown by recent surge in trade as a share of global gross domestic product and foreign direct investment flows. Subramanian and Kessler (2013) makes a succinct periodization of world economic history, labeling the current era as hyperglobalization. Growing at a rate considerably higher than GDP since the early 1990s, both exports and foreign direct investment flows now make up a higher share of global economy. To put things in perspective, it is better to quote a few numbers. In the last two decades, Subramanian and Kessler states, the ratio of merchandise exports to global GDP has gone from 15% to 26%, and goods and services exports reached to 33%. The figures about FDI both in flows and stock indicate the same pattern. Starting from a low base of nearly 0.5 percent, FDI flows as a share of total value added soared to as high as 4% just prior to the Great Financial crisis by recording a sevenfold increase. Global FDI stock as a percentage of global GDP leapt from less than 10 percent in 1990 to 30 percent in 2011. The level of FDI flows and stock has already overtaken the levels achieved in the first globalization period before the First World War. The interesting feature of hyperglobalization is not limited to the so-called exponential growth of global trade and capital flows. The chief agent which carries the globalization to new highs appears to be multinationals operating overseas. Multinational firms put their mark on this hyperglobalization period with more than 80,000 companies constituting approximately two-thirds of global trade as of 2009.

Therefore, we can safely put forward that there are mainly two dimensions to globalization. One is related to an expansion in the volume of global trade due to free movement of goods and services across boundaries as tariffs and other barriers to trade have been dismantled since the 1980s. The other has to do with deregulation of capital accounts for the majority of countries all over the globe so capital can freely move from one country to another. From now on we will designate them by trade globalization and financial globalization, respectively, only for the sake of analytical purposes.

Earlier in its primary stages, many economists pinned their hopes on globalization process with respect to convergence between high and low income countries. Globalization is supposed to work in developing countries' favor by helping them win new markets and acquire the required technology they lack in so they could be able to narrow the income and technology gap between advanced countries and themselves. Therefore, globalization is thought to foster industrialization among developing countries and unleash the forces toward convergence. We will briefly go over these great expectations attached to globalization.

One of the channels through which globalization has supposedly favorable effects on developing countries' industrialization works through the demand-side. In a closed economy developing countries would have to develop a diversified industrial base which might prevent them from having economies of scale in the absence of a large domestic market size. However, with the opening of foreign trade, these countries would be driven to specialization in the production of goods in which they have comparative advantage. In other words, economies of scale coming with specialization along the line of comparative advantage is made possible by having access to export markets, that is, globalization in the sense of greater trade integration. The reasoning runs as follows: As the developed countries expand their industrial production, the opportunity cost of manufactures increases and their comparative advantage in them declines accordingly. The increasing marginal cost of producing manufactures in developed countries would trigger a shift of manufacturing activities into developing countries. (Vernon, 1966; Papageorgiou et al. 2018) This is a typical textbook case of tangent lines along the concave production possibilities frontier getting steeper as more of a product is produced. The globalization would diminish the developed countries' comparative advantage in manufactures and open the gates of industrialization for developing countries.

On the other hand, globalization would work out its positive impact through the supply side. With deregulation of capital accounts, capital inflows in the form of foreign direct investment and/or portfolio investments would provide developing countries with the capital they much needed. Local companies with an access to international capital markets could raise additional funds by issuing their corporate bond. Being able to invest more than what they save, developing countries would achieve a higher rate of gross fixed capital formation and thus start their catch-up industrialization. Financial globalization would see to it that hard currency bottlenecks will cease to be a binding constraint for developing countries' bid for industrialization. Moreover, foreign direct investment, unlike the portfolio investments or other investments, has also the merit of bringing cutting edge technology home, which is a blessing for countries with little to none technological base. Hence, improvements in technology would take place through import of capital (Papageorgiou et al. 2018).

Unfortunately, globalization did not live up to these expectations. We have already seen that to the contrary, globalization brought deindustrialization to many developing countries. Here we would like to elaborate on how globalization has failed to deliver its promise of convergence. The first thing to note is that there is no general convergence trend encompassing the whole developing world except the first half of the first decade of the 2000s. The growth pattern of real GDP per capita at PPP for developed and developing countries suggests a rather alternating periods of convergence and divergence. (UNCTAD, 2016) Second, developing countries as a whole did not present a uniform growth trajectory. East Asian countries seems to have fared well in catching up with the United States but the rest of developing countries could not close the relative income gap. UNCTAD (2016) stresses that by 2014 the gap still hovered around 0.9 or more for a significant number of developing countries. To put it in simple English, per capita income in many developing countries was at most one-tenth of that of the United States in 2014 despite the continued economic growth performance for a quarter century. Moreover, the globalization did not improve the prospects of moving up from low and middle income status to high income status, either. (UNCTAD, 2016) To the contrary, the probability of becoming a high income country for a middle income country declined to 8% between 1980 and 2010 from 18% in the previous 30 years. In the same fashion, the likelihood of moving from a low to middle income country has decreased from 15% to 7%, a significant drop of more than 50%. Globalization indeed made the things worse for middle income countries, let alone help them move into high income status. During the period 1950-1980 the probability was 12% that a middle income country is relegated to a low income status. In the subsequent 30 years this risk of falling behind almost doubled, going up to 21%. Globalization let its supporters down in many aspects.

In addition to a divergence of fortunes for high and low income countries, globalization also removes the main vehicle with which developing countries could climb up the income ladder, manufacturing industry. We will extensively explore the contribution of manufacturing industry to positive structural change and convergence. Now, we want to turn the attention to the question of why globalization is associated with deindustrialization, especially among developing countries.

Subramanian and Kessler (2013) claim that globalization led to the decline of manufacturing industry and the rise of services sector in a subtle way. As we will discuss later more extensively, the breaking-up of the value-added chain as a result of the information and communication technology revolution results in the rise of multinational corporations which can move any particular production stage into wherever its production cost is lowest. This new phenomenon, however, artificially inflates gross export flows because at each link in the value chain the product in the making is recorded as exports. Hence, export figures in gross terms do not truly reflect flows of value added in real terms since the former overstates the latter. According to Johnson and Noguera (2012), the value-added exports ratio in manufactures which is value added exports divided by gross exports declined from 60% in 1980 to 45% in 2009, a sign of sprawling global value chains. So far, so good. But there is more into it. Not only do export flows in gross terms blow up real value added flows but also gross services trade as a share of world GDP understate its real share when computed in value added terms. The latter can be explained by the fact that most services which do not count as tradable directly enter into the production of tradable goods. Services embodied in the products are not recorded as tradable in gross trade figures but they are considered as tradable in value added terms because the production and consumption of those services take place in different countries. Therefore, trade in services is of greater significance than is suggested by traditional statistics, and moreover, it gets an ever more significance as the hyperglobalization process picks up steam. While services as a percentage of overall global trade showed a modest increase from 17% in 1980 to approximately 20% in 2008 in gross terms, both its level and growth rate is calculated to be higher in real terms with a rise from 30% to 43% in the same period. Trade in the hyperglobalization era undergoes what Subramanian and Kessler refer to as a “dematerialization” process, that is, since goods that are tradable contain more and more services which are not captured by gross trade data, the nature of international trade is increasingly moving from tangibles to intangibles. In other words, trade in services in value added terms grows so fast that it could overshadow trade in goods in the near future. Hence, they conclude that hyperglobalization increases the importance of services trade in a considerable degree, creating a hostile environment for those developing countries struggling to build up a robust domestic manufacturing industry.

To describe this hostile environment from a global perspective, we should look at the intense competition raging among developing countries for worldwide manufacturing demand. And we had better start with quite an insightful stylized fact discovered by Felipe and Mehta (2016). According to the data compiled by Felipe and Mehta, it turns out that the globalization of supply chains resulted in a constant share of manufacturing in both global employment and value added over 1970-2010. Namely, the share of manufacturing in global employment and value added between 1970 and 2010 has remained constant at 14% and 17-18%, respectively. The dataset is quite comprehensive in that the observations about manufacturing employment and output cover 64 countries making up 82% of the world’s population and spans a time period ranging from 1970 through 2010.

One result we could draw from this puzzling fact is that a global improvement in the manufacturing labor productivity has not been the culprit for premature deindustrialization. To be more precise, since manufacturing sector has not shed labor globally, differential productivity growth and technological changes are not to blame for depriving developing countries of manufacturing jobs and output. The constant share of manufacturing in global economy reveals that labor productivity in manufacturing has grown at a par with the aggregate labor productivity on a global scale. In other words, the deindustrialization within individual countries due to differential productivity growth did not give rise to a decline in global labor requirements of manufacturing sector (Felipe and Mehta, 2016).

Then a question pops up: why near constancy of manufacturing share in global economy over four decades? Here Felipe and Mehta (2016) put the blame on newly industrializing countries with great demographic strength and abundant supplies of cheap labor. Even though labor productivity grows faster in manufacturing industry than in the rest of the economy for individual countries, the manufacturing employment and output has kept shifting from high to low productivity countries globally. With manufacturing industry being viewed from a global perspective, it is seen that high productivity growth with countries has been offset by a decline in the level of labor productivity as manufacturing jobs and value-added has been reallocated from North America and Europe to China and South Asia. Now, it should not be surprising that the drop in the contribution of North American and European manufacturers to global employment and output is roughly matched by a hike in the corresponding shares of East Asia, South Asia and China.

What are the implications of a near constancy of manufacturing in global economy for premature deindustrialization? For one thing, the competition for a fixed share of worldwide manufacturing employment and value added suggests that some of developing countries have industrialized at the expense of other developing peer countries. Namely, as we have already shown empirically, China and East Asia industrialized while Latin America and sub-Saharan Africa deindustrialized since not all countries can succeed together (Papageorgiou et al. 2018). For another, it makes the prospects of those developing countries wishing to enlarge their manufacturing industry so as to catch up with frontier countries grimmer. The competition among newly industrializing countries quickly turns into a sort of zero-sum game where only a few developing countries can industrialize to the detriment of other countries. As the competition get ever more intense, then the share of manufacturing jobs and output an average country newly embarking on industrialization path wishes to attain becomes smaller and is achieved faster only to see it wane down. Hence an increasing share of low productivity countries with a great pool of cheap labor-force in global manufacturing employment and value added has brought down both the maximum share of manufacturing an average developing country could hope to attain and the level of income associated with that share.

Felipe and Mehta (2014) summed up the difficulties for late industrializers in the age of globalization as follows: i) the cut-throat competition to host more manufacturing activities is raged among many low-wage countries as supply chains get more globalized, and ii) labor saving technological change disadvantages less-skilled labor-force abundant in countries into which manufacturing employment has been reallocated from North America and Europe. With both trends combined, it becomes less and less likely that those countries which have not completed their industrialization to the fullest could ever see the high shares today's industrialized countries have pulled off in their past.

The fierce competition among developing countries over export markets usually takes the form of undervaluation policies. By maintaining undervalued currencies, these countries would be able to hit two birds with only one stone since a competitive real exchange rate works as both import tax and export subsidy. However, it is not that difficult to see how it feeds into a vicious circle in which undervaluation policies pursued by one or more developing countries could only end up in the depressed prices for manufactures in the medium term, thus making specialization in manufacturing industry harder for peer countries. Mattoo et al. (2012) found that a 10 percent real depreciation in Chinese yuan causes a developing country's exports to third markets to decline by 1.5 to 2 percent.

To make the things from bad to worse, many developing countries have opened themselves into international trade at a time when their domestic economic conditions were not ripe for that decision. Many developing countries without a robust industrial base could not resist the competition imports have brought in once they liberalized their trade regime. Rodrik et al. (2014) claim that trade liberalization resulted in intensification of import competition, which in turn led to rationalization of operations in manufacturing. Under pressure from imports, many local enterprises have got rid of "excess" labor and least-productive firms have been eliminated so that even though labor productivity seems to have risen within manufacturing, the sector lost too much in terms of relative employment. This has been mostly the case with Latin America and Africa. Only a few most established firms have been able to close the productivity gap with the technology frontier in manufacturing industry since the start of trade liberalization, and this trend has not been confined to only East Asia. But this achievement came with a price, considering how the increase in the average labor productivity in many developing countries' manufacturing sector came about. Many local firms with a marginal cost substantially higher than world prices have been driven out of business as a result of opening to free trade, and those which could hold their ground against imports had to force some of their workers to leave their jobs. The average manufacturing labor productivity has increased because the market share of most productive firms has grown larger due to the forced exit of many least-productive firms. Therefore, only a portion of manufacturing firms succeeded in a contracting industry overall. A rise in manufacturing productivity coincided with premature deindustrialization and stagnating overall productivity growth.

A case in point is Argentine and Zambia (Rodrik et al., 2014). Argentine experimented with hyper-openness and thus underwent premature deindustrialization which gave rise to a growth-reducing structural change. To put it simply, free trade destroyed many manufacturing jobs, and the labor thus released from manufacturing have found employment in lower productivity sectors or gone simply unemployed at all, reducing overall productivity growth. After liberalizing foreign trade, Zambia experienced a harsh employment deindustrialization, and many Zambian workers who found themselves unemployed went back to agriculture sector which has only half the overall labor productivity. The resultant growth-reducing structural change can then be attributed to labor moving from higher productivity sectors like manufacturing to lower productivity sectors like services and agriculture.

Dasgupta and Singh (2006) also claim that implementation of trade liberalization in those developing countries ridden with relatively high foreign debt gave rise to "pathological deindustrialization" in Latin America and Africa in the 1980s and 1990s. Burdened by heavy foreign debt, many developing countries sought help during the debt crisis in the 1980s from international financial institutions whose bailout programmes were offered on the condition of executing liberal reforms in recipient countries. As a result of these reforms, these countries which were forced to abide by policy recipes imposed from those institutions have been driven to industrialization along their current comparative advantages, paying no attention at all to their long-term dynamic comparative advantages. At the end of the day, their ability to build up a solid industrial and technological base as well as a modern services sector has been crippled by these wrong policies. Getting more exposed to external financial shocks, the economic growth in these countries often ran against the balance of payment constraint.

Trade liberalization policies which put into practice after the debt crisis in the 1980s in many Latin American and African countries reversed the import-substitution industrialization policies along with their achievements. Timmer et al. (2014) note that productivity growth of manufacturing industry in Latin America and Africa recorded a similar growth rate to the United States frontier during the import-substitution industrialization period so the trend had not been divergent as was the case with the globalization period later. Hence, the expansion of manufacturing production in Latin America and Africa during the 1960s and the early 1970s did not lack in international efficiency since manufacturing productivity growth in these regions did not lag behind that of the United States. However, with the end of import substitution industrialization, manufacturing productivity in these regions exhibited a divergent trajectory with the technological frontier

Castillo and Neto (2016) particularly stress that during the import substitution industrialization period developing countries in Latin America such as Brazil and Mexico benefited to a great extent from allocative efficiency as employment shifted from low productivity sectors like agriculture to higher labor productivity sectors like manufacturing. Similarly, abandonment of this development strategy led to the contribution of structural change to overall productivity growth turning negative.

The impact of globalization on the fate of industrialization policies in developing countries cannot be fully assessed without examining the role global value chains play in manufacturing activities. In terms of our discussion on premature deindustrialization, it becomes extremely important to clarify if global value chains helped or retarded developing countries' industrialization efforts.

One of the hallmarks of globalization has been the emergence of international supply chains as can be proxied by the share of intermediate products in global trade. According to World Trade Statistical Review (WTO, 2019), intermediate products which are mostly traded along international supply chains constitute more than half of global trade in goods and services. In 2015, global value chains incorporated as high as 57 percent of world trade.

The literature on the relationship between participation into GVCs and developing countries' efforts at industrialization is far from being conclusive about the direction of association.

Beltramello et al. (2012) argue that GVCs help developing countries' bid for industrialization by providing them with vast exporting opportunities while Peneder and Streicher (2018) provide evidence that the net export channel which reflects GVC-based measure of revealed comparative advantage based on global input-output tables has negatively contributed to the manufacturing value-added share of developing countries in their sample between 2000-2014. Developing countries could have better access to information through the international production networks and develop new competencies and acquire technological skills by trying to live up to quality and business standards set by the GVCs (Gereffi 2018; Staritz et al. 2011). Participation in GVCs also lift the burden of building up a whole supply chains for developing countries so they could experience fast industrialization by focusing on a narrow set of competencies at which they would have competitive advantage (Baldwin 2013). They could also enhance their overall productivity by making an extensive use of high-quality imported inputs (Kummritz 2016; Kummritz et al. 2016; Amiti and Konings 2007; Topalova and Khandelwal 2011; Crino 2012). However, taking part in GVCs alone might not suffice to upgrade their economies unless accompanying policies targeting infrastructure, investment, trade, financial and labor markets, etc. are implemented by developing country governments (Kummritz, et al. 2016).

It, however, seems that these favorable effects of GVCs are confined only to a limited number of developing countries. Baldwin and Okubo (2019) build a model where the sprawling of supply chains and the associated outsourcing result in rapid deindustrialization of advanced countries like G7 and rapid industrialization of a few developing countries like China, South Korea, Mexico, and Thailand. However, some of those developing countries usually undertake the labor intensive parts of manufacturing production like assembly activities in automotive and machine industry, largely functioning as a platform for exports to rich markets in the case of China and Mexico.

Other skeptics in the literature also question the way the structure of GVCs affect the industrialization path of developing countries. Sumner (2019) identifies three channels through which the participation into global value chains might be associated with the premature deindustrialization. Trade liberalization would make developing countries import the price tendencies originated in the industrialized countries so the productivity gains in manufacturing translated into relative prices introduce deindustrializing dynamics into late industrializers (Rodrik 2015); developing countries might get trapped in the low value-added segments of the global value chains which are more accessible to them (UNCTAD 2016); the distribution of manufacturing activities across many competing developing countries would result in anemic industrial growth in host countries. Hence the main benefit of outsourcing to developing countries would practically be rendered ineffective by the sprawling of supply chains and the accompanying scramble for hosting manufacturing activities.

In order to truly assess the direct and indirect effects of GVCs, we have to examine their relation to income distribution and institutional framework within developing country context.

With respect to the inequality aspects of GVC participation, Timmer et.al. (2014) find that more than nine-tenths of the supply chains witness both a decline in the low-skilled labor share and a rise in the high-skilled labor share (including that of managers and CEOs) in value-added while the share of capital in value added has risen in two-thirds of the chains between 1995-2011. Hence, the industrialization through participation in global value chains involves a deterioration in income distribution.

The link between institutional quality and participation into GVCs is also far from being clear-cut. While it is being held true that countries engaged in complex value chains where trade flows cross borders at least twice (Wang, et.al. 2016) tend to be equipped with high-quality institutions since the industries involved are more sensitive to the quality of institutions, backward participants into GVCs, on the other hand, are generally found to have weak institutions (Dollar, et.al. 2016). As backward participants usually engaged in downstream sectors, developing countries depend on the importation of technology-intensive intermediate products. Nunn (2007) finds that the institutional sensitivity increases in direct proportion to the technological content of production. Hence, the availability of tech-intensive inputs is directly related to institutional quality (Jones 2011). It makes sense that backward participants into GVCs which extensively import sophisticated intermediate products from upstream countries happen to suffer from the lack of well-functioning institutions (Dollar and Kidder 2017, Rodrik 2008).

According to Baldwin (2013), the information and communication technology revolution in the middle of 1980s drove what he referred to as the second unbundling in the production process where the fragmentation of the whole production complex is made possible with a significant reduction in coordination and transmission costs. Since then, each stage in production process could be located wherever it is to be carried out at the lowest cost. Thus, newly industrializing countries has been able to join the global supply chains instead of building up a new one. Industrialization through participation in international supply chains provides an easier and faster way of economic development for developing countries. The usage of imported varieties which is essential to any production process carried out along the global value chains raises the social value of marginal product of labor in manufacturing, thereby making the industry less lumpy. On the other hand, the decline in coordination costs leads to a rise in the volume of foreign trade in intermediate goods. The meaning of this for developing countries is that the range of intermediate goods production in sophisticated segments would get considerably narrowed while the competitiveness for downstream production which is usually associated with labor-intensive activities would enhance as a result of the narrowing margin between the price of imports at home and exporters' net unit revenue once allowed for transportation, coordination, and tariff costs. However, the industry thus constructed would have a highly narrow range if we take the presence of multinationals in global value chains into account. Unlike the 20th century-style industrialization in which a deep industrial base was created alongside a large market to prop it up, the efforts of developing countries in the age of second unbundling can be termed as "enclave industrialization" where the modern manufacturing units are totally isolated from the rest of the economy. What manufacturing plants in this setting lack in is a sort of interconnectedness for being a part of an industrial complex. For this reason, offshoring concomitant to the second unbundling killed import substitution industrialization policies in developing world. Baldwin points out that the only winner in this way of organizing production across the globe should be multinational corporations located at the headquarter economies since they now are able to blend state of the art technology at their disposal with the low labor cost prevailing in populous developing countries. Moreover, to ward off the birth of potential rivals, multinationals usually take cautious steps and therefore are loath to spread any know-how to local producers except quite a limited one. Multinationals thus block the diffusion of a broad range of technological know-how and prefer to share only a slice of industrial competencies with their arms-at-length partners in developing countries. It is true that multinationals spare local producers the burden of developing state of the art technologies, and searching for markets to sell products, and so on. But the flip side is that developing countries builds up their industries on a very narrow base. To sum it up, in the age of sprawling supply chains, the industrialization of developing countries gets easier and faster but less meaningful.

The asymmetric power relations between lead firms and their suppliers are indispensable to value chains. A pattern of new international division of labor has emerged between headquarter economies versus factory economies. Multinational corporations mostly headquartered in rich and developed countries command the high end of global supply chains so they are in a position to take advantage of global labor-cost arbitrage (John Smith) by having an access to global labor pool. Nolan (2012) claims that a handful "system integrator firms" dominate many sectors such as large commercial aircraft production, automobiles, information technology where global value chains are organized. Starss (2014) finds that as of 2013, large corporations headquartered in developed countries captured the biggest market share in 20 out of 25 sectors like automobile, chemicals, electronics, financial services, heavy machinery, and media.

The unequal relationships along the supply chains brought a deterioration in terms-of-trade for many developing countries. Lead firms in international production networks do not hesitate to use their position to spur competition among their suppliers, forcing them to embark on price cutting strategies with attendant wage compression. The result has been a global race to the bottom. Exports by developing countries are usually low-skilled labor intensive goods as a result of which the unit export price of developing countries oriented to exportation of manufactures has tremendously declined over 1980-2014. According to UNCTAD (2016), unit export price of Asian manufactures exporters has seen a decline of 1.3 percent during the period. They conclude that manufacturing exports increasingly put on characteristics similar to those of primary commodities in the past by evoking the Balassa-Samuelson model.

A major criticism of global value chains rests on the fact that only low value added links of them are by construction most accessible to late-industrializers. With a narrowing domestic value added margin due to the heavy use of imported components in production, backward participation in value chains does not serve the purpose of a meaningful industrialization for many developing countries. And also engaging in low value added activities carries the risk of hampering their potential to move up the technology and value added ladder (UNCTAD 2015). The prevalence of industrial units highly specialized only in very specific parts of production along with their enclave nature (Gallagher and Zarsky, 2007; Dussel Peters, 2008; Plank and Staritz, 2013; Pavlinek, 2015; Pavlinek and Zenka, 2016) blocks productivity gains in manufacturing from spreading over to other sectors. And an industry built up on the base of backward participation in supply chains can be highly specialized so the industry's fortune may be tied to a few activities (OECD et al., 2013). Hence, the bottom line of taking part in global value chains can be summarized as "thin industrialization" (Gereffi, 2014). By raising the import content of export-oriented manufactures, backward participation in supply chains may have played a role in decreasing the share of manufacturing sector in GDP for some developing countries.

One clear example of how supply chains may result in weak production linkages in domestic economy is the so-called maquila industry in Latin America, which is itself a form of assembly manufacturing. Reeling from the debt crisis in 1980s, Mexico found the solution to stagnant productivity growth in joining the North American Free Trade Agreement (UNCTAD, 2016). The reorientation paved the way for building up assembly plants, which had become part of US firms' supply chain. Participation in supply chains has weakened the interconnectedness of local industrial units. Thus, manufacturing activities mostly consist of assembly of imported high-tech components for re-exportation, narrowing the domestic value added margin and ending up in the enclave nature of local industry with almost no connection to the rest of economy (Cruz, 2015; Palma, 2005). This is one of the reasons why export sophistication index may not be a reliable indicator to measure the technological strength of a developing country. It is important to add that this feature of disconnect between export industry and domestic economy is not limited to Latin American assemblers. Some East Asian countries like Indonesia and Thailand also suffer from a lack of production linkages through which export successes create a virtuous cycle in the form of increased economic activities in other sectors (UNCTAD, 2016).

The invaluable Trade in Value-Added (TIVA) database of OECD (Escaith and Gaudin, 201) offers many insights into the effect of participation in global supply chains on developing country's manufacturing industry. Its main merit lies in the fact that gross export flows are netted of imported contents for reexport so we can obtain a measure of domestically created value added in one unit of exports. In two scatterplots below, we put the change in the share of manufacturing industry in nominal GDP against the change in the domestic value added share of exports of manufactures. Our variables are specified in terms of difference in percentage points between 1995 and 2011, and between 2005 and 2016 since OECD published its TIVA indicator in two different series. We calculated the decrease or increase in the share of manufacturing in nominal GDP from World Bank, World Development Indicators database.

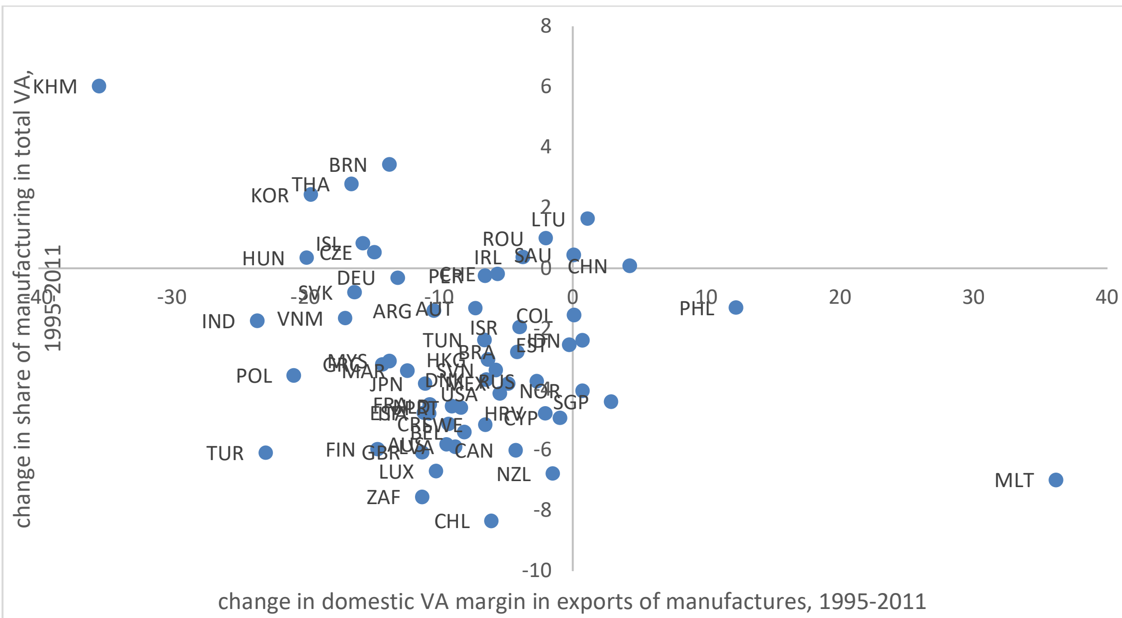

Figure 3. 1: Participation in GVCs and Deindustrialization between 1995-2011.

The message of the first scatterplot (Figure 3.1) is crystal-clear: most of the countries are located in the lower left quadrant, indicating that in this period of quickening globalization between 1995 and 2011 the overwhelming majority of both developed and developing countries alike increased their participation in global value chains as indicated by a decline in the domestic value added share of exports of manufactures but this occurred at a cost of a decline in the manufacturing's output share. As domestic value added margin declined in exports of manufactures mainly due to the participation in value chains, then the manufacturing industry accounts for a lesser portion of total value-added created. Exports of manufactures included more imported intermediate goods in relative terms, thus narrowing the domestic value added margin in home country.

As one dollar of gross exports contained less and less domestic value-added, then the participation in global supply chains seems to have eroded the share of manufacturing in nominal GDP.

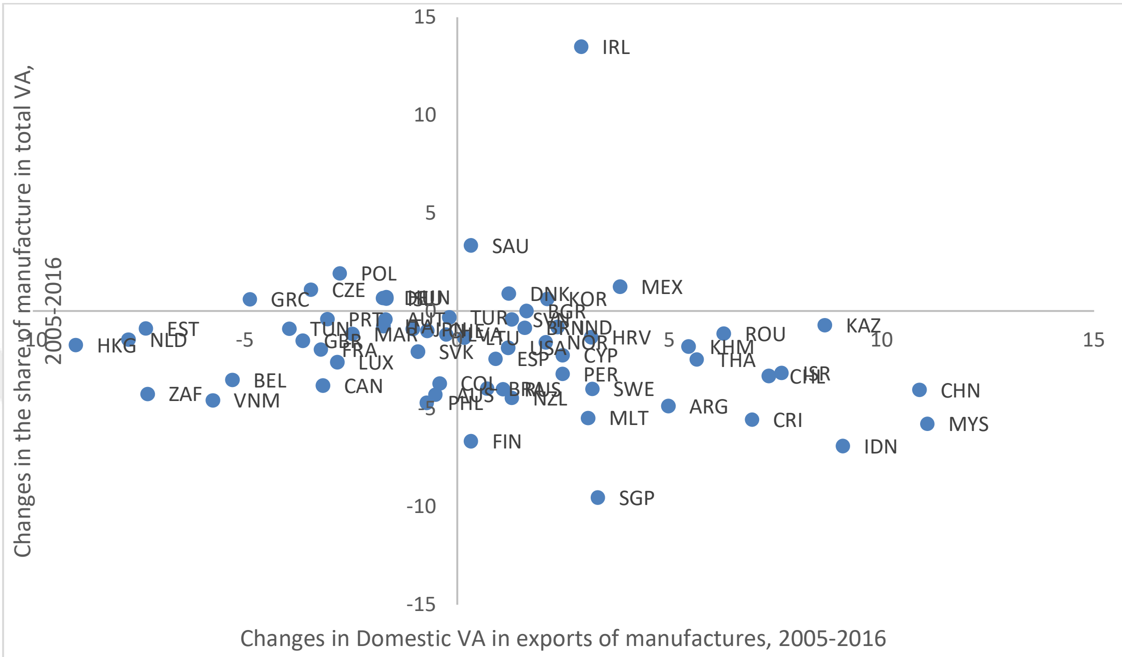

Figure 3. 2: Participation in GVCs and Deindustrialization between 2005-2016.

However, the picture gets more nuanced when we look at the second scatter plot (Figure 3.2) which covers the years between 2005 and 2016 but one thing still stands out: regardless of an increase or decrease in domestic value added share of exports of manufactures, the overwhelming majority of countries in the sample has kept deindustrializing as shown by the crowd of dots below the horizontal axis. Now some of the countries previously located in the lower left quadrant now shifted their location into the lower right quadrant, suggesting that they gained some ground in the value-added creation they had lost to globalization before but this did not translate into a higher share of manufacturing in gross domestic product. Here, the Great Financial crisis of 2008-9 may have played a role in disrupting supply chains so countries should have decided to produce more things in-house. On the other hand, even though domestic value added margin had widened in exports of manufactures, the volume of gross exports seems to have not expanded enough to pull up the manufacturing share of total value added in the same period. This is highly probable given the sluggish performance of international trade in the aftermath of global crisis. The rise in the domestic value-added created per dollar of gross exports is more than offset by the stagnant gross exports performances for those countries located in the lower right quadrant.

Even though it is not the best of all possible worlds for late industrializers as we have seen above, Rodrik (2018) states that it has become more difficult for developing countries to join in international production networks and it will continue to be so due to the recent trends in technological change. New technological improvements have mainly dual character both of which disadvantages developing countries wishing to participate in supply chains: They are unskilled-labor augmenting and tend to reduce the elasticity of substitution between capital and labor. Since the comparative advantage of developing countries with abundant unskilled labor-force lies in the labor-intensive production which is threatened by recent technological changes, they find it harder to integrate into production networks. Moreover, a decline in the elasticity of substitution in the production function due to technological changes deprives developing countries of their means to make up for their shortage of capital. Looking at the technological trends, Rodrik concludes that the future of developing countries will not be shaped by global value chains. We could add that their past with them has not been that promising for the future, either.

3.2 Financial Globalization

Globalization with its trade and financial aspects has had unfavorable effects on deindustrialization in most of developing countries. We have already dealt with the harmful ways trade globalization works out its impact on struggling manufacturing sector in newly industrializing countries. Just as the trade globalization did not create the external demand conditions which were considered as essential to developing countries' convergence with the global income frontier, financial globalization was a disappointment as well because it did not provide capital-stricken countries with necessary additional funds for a substantial rise in their investment level (Rodrik and Subramanian, 2009). To the contrary, financial globalization did harm to the development of manufacturing industry in developing world. We now want to examine how financial globalization retarded industrial development in developing countries. However, we would like to say at the beginning what we will say at the end: while developing countries are driven to import depressing relative price tendencies for manufactures originating in industrialized world through trade globalization (Rodrik, 2015), real exchange rate appreciations linked to financial globalization crippled the growth of their manufacturing industry by tipping the relative price scale against tradable sector.

After reviewing the models linking a slump in the size of manufacturing industry in developing regions to real exchange rate appreciations, we plan to move on discussing the transmission mechanisms through which financial globalization causes the local currencies to get overvalued with a special focus on policy choices.

The Kaldorian growth models view real exchange rate as a determining factor on the size of manufacturing sector in an economy (Gala, 2008). Simply defined as the price ratio of tradables to nontradables, the level of real exchange rate is the most powerful macroeconomic variable which decides what sectors will survive or go extinct under open economy conditions. To be more specific, the profitability of investments in manufacturing, which is the most important component of tradable sector, depends to a great extent on the prices of tradables relative to nontradables. A real exchange rate appreciation which finds its expression in falling relative prices of tradables to nontradables makes real wages higher, putting "strong profit squeezing effects in the tradable sector" and sapping investment activities in manufacturing industry. A higher consumption level is consistent with a rise in wage wages since workers have higher marginal propensity to consume in contrast to the entrepreneur class which has high propensity to save. By bringing down gross capital formation in tradable sector, an overvalued currency often results in resource reallocation away from high-productivity activities in manufacturing where increasing returns apply towards low-productivity activities. Strong overvaluation attacks are thus associated with overall productivity losses. Kaldor (1978) also points out that overvaluations may get in the way of absorbing surplus labor existing in developing countries, thereby preventing them from attaining a mature economic state in which excess labor has been employed in high-productivity sectors.

Export-oriented approaches, on the other hand, stress the importance of maintaining a competitive currency which is vital for the promotion of manufacturing sector exports. A depreciated real exchange rate encourages an expansion in manufacturing output through export markets. Supporters of export-oriented industrialization approach recommend that real exchange rate could at least temporarily be used as an incentive to move factors of production into manufacturing sector. The exchange rates should be “realistic” enough (Balassa, 1987) to support for the nontraditional export commodities. A “partially compensated devaluation” by, say, tariff reductions to reduce its inflationary effects, Balassa (1993) proposes, would have the same favorable effect upon the modern tradable sector as the export subsidies provided to it. Insofar as export demand is elastic, there also would be no need for cutting prices to sell more abroad. When price is treated as fixed, any increase in labor productivity leading to an expansion in the manufacturing output will translate into a higher share of manufacturing in total value-added (Eichengreen, 2008). In addition to spurring overall economic growth by realizing dynamic productivity gains of an expanding manufacturing sector, Williamson (2003) cites one of the benefits of the promotion of nontraditional exports as avoidance of Dutch Disease which could drag the countries with rich natural resources into deindustrialization with all its negative consequences.

Balance of payment-constrained growth model agree with the export-oriented approaches that real exchange rate depreciation is beneficial to the growth of tradables sector, and manufacturing industry in particular but they differ on whether this is achieved through a greater external demand provided by net exports or a higher rate of gross capital formation funded by export receipts. The balance-of-payment constrained growth models suggest that the positive effect of real exchange rate depreciations on manufacturing sector works through investment channel rather than stimulation of exports.

The starting point for balance-of-payment constrained growth models is where the import-substitution industrialization failed in many experiments throughout the developing world: the hard currency bottlenecks. As is well documented, import substitution industrialization attempts eventually ran into balance of payment difficulties manifested in the 1980s debt crisis in Latin America and Africa. In the early phase of import-substitution, the consumption goods imports decline while capital goods imports rose when developing countries started to industrialize by producing relatively low technology-intensive manufacturers. However, as countries moved on the path of industrialization then they found it hard to industrialize further since they arrived at the stage where the substitution of capital goods imports had become the next step to take. That is because the production of capital goods usually requires the employment of an immense amount of fixed capital and technology and that was exactly what they had lacked in. The meagre sources of foreign exchange revenue at their disposal at that time did not enable them to move into this higher phase of industrialization (Porcile and Lima, 2010).

The message this type of models conveys is that real exchange rate devaluations may help developing countries overcome the hurdles of external financing needs for acquiring capital. The domestic demand for tradable goods decreases after a real depreciation makes them relatively more expensive for residents. Hence, a larger share of tradable goods can be destined for exports. In the framework of balance-of-payment constrained growth models where all capital goods are purchased from abroad since the domestic economy lacks in an advanced industrial base which can provide local entrepreneurs with investment goods, which is more or less the case with many developing countries, an increase in exports generates foreign exchange inflows with which capital goods can be imported and thus capital accumulation could gather steam with a surge in investment activities. It is important to note that the emphasis here is placed upon investment promotion rather than export-led growth (Razmi, et al., 2012a). Likewise, in the case of real exchange rate appreciation, long-run growth would run into balance of payment constraint again. In this setting, a rise in nominal wages translates into a real appreciation through its inflationary effects and thus makes exports less competitive visa-a-vis the outside world. The current account balance would deteriorate as a consequence of real depreciation, thereby crippling the country's ability to generate foreign exchange revenue and draining the resources to finance capital goods imports (Porcile and Lima, 2010). The lack of hard currency would slow down capital accumulation, leading to a contraction of manufacturing activities. Razmi, et al. (2012b) empirically tested their growth models and concluded that the long-run coefficient before both the overvaluation and undervaluation is statistically significant, suggesting that the latter encourages investment growth in developing countries while the former discourages it.

At this point of theoretical analysis of the relationship between real exchange rate and manufacturing industry, we want to draw attention to the way they are related to each other. It is often stated that real appreciations squeeze the profit margin of manufacturing industry by making wages higher in real terms. For the sake of a complete exhaustion of theoretical analysis, we would like to point out to a possibility that real appreciation may have a favorable effect on the development of manufacturing industry. Here, we should invoke Pugno's critique (1996). He suggests that a rise in real wages resulting from labor shortage in a rapid growth environment puts a squeeze on profits which could impel the capitalist class to introduce new technology to save on the increasingly high labor costs. It also would be easier for them to do so because an appreciated real exchange rate makes the importation of capital goods less costly so capital-intensive industries could develop faster in these conditions. Therefore, labor-saving technological progress and improvements in labor production would owe much to a rise in real wages. In putting forward the policy suggestion that a competitive currency fosters industrial development, we should be very careful that real exchange rate depreciations are equivalent to lowering real wages and this type of policy recipes often promote labor-intensive industries through exports channel. On the other hand, an appreciated real exchange rate might also provide an environment conducive to industrialization in which high real wages would put cost pressures on entrepreneurs to improve labor productivity and adopt new technologies which could save on labor-force just like the United States industrialists did in the aftermath of Civil War. We should bear in mind that the nineteenth century American industrialization took place with high real wages.

Rodrik and Subramanian (2009) developed a model why financial globalization has failed to spur much expected investment growth in developing countries. They set out their work by grouping developing countries according to the type of constraints against imposed upon them in their growth process. Some developing countries endured a stalled growth due to an inadequate access to finance while others are constrained by insufficient investment demand. They add that low investment demand is a much more binding constraint for the majority of developing countries compared to savings-constrained countries and is more prevalent phenomena across the developing world. Exogenous capital inflows into emerging market economies as proxied by a fall in the United States interest rates are not correlated with a higher level of investment activities, suggesting that developing countries does not suffer from a lack of financial resources. Instead, a strong positive correlation indicates the effect of demand channel such that a drop in consumption in the United States, the largest market in the world, accompanied by a higher interest rate blunts the export prospects for many developing countries with open capital accounts. They also go on to explain that inadequate investment demand in developing countries stems from their poor institutional framework within which property rights are widely violated, contracts are weakly enforced, and so on. While financial globalization greatly relaxed the binding constraints for countries suffering from a lack of adequate savings for growth, it simply did not address the problems of investment-constrained developing countries. Contrarily, capital inflows made recipient countries' economic problems worse. Rodrik and Subramanian specifically single out the experience of Turkey and El Salvador (Acosta et al., 2009) with financial openness in which access to global liquidity actually went to finance the expenditures of extravagant governments and boosted unproductive consumption activities, respectively.

But there was more into it. Since developing countries are mostly constrained by insufficient investment demand, capital account liberalization which is the main characteristic of financial globalization not only does not help them relax the unbinding savings-constraint but also harms their manufacturing industry through real exchange rate appreciation. In particular, real exchange rate appreciations associated with exogenous capital inflows reduce the relative profitability of tradable sector including manufacturing industry. In other words, the impact of capital inflows on investment-constrained economy is purely to encourage public and/or private consumption while the appreciated real exchange rate severely damages the outlook of investments in tradable sectors by reducing their profitability: "Real exchange rate appreciation reduces the relative profitability of industry and slows down its rate of growth." (Rodrik and Subramanian, 2009: 132)

Now that we have explained the pernicious effect of real appreciations on manufacturing industry, we are able to analyze the historical and economic conditions for causing the real exchange rate to appreciate.

Financial globalization has mainly brought liberalization of capital accounts and disinflationary monetary policies to many developing countries grappling with the huge pile of foreign debt. Bresser-Pereira (2002) described this paradigm as "second Washington consensus". In the 1990s the second Washington consensus introduced an economic growth strategy for developing countries which can be summarized as "growth-through-foreign savings". With this strategy, capital abundant countries coaxed developing countries into liberalizing their capital account and also encouraged them to curb high inflation rate prevailing there at that time by carrying out contractionary monetary policies. Therefore, in many developing countries interest rates were raised to halt the inflationary spiral while letting capital freely move in and out of country. High interest rates coupled with deregulated capital accounts left developing countries with overvalued currencies as a result of huge capital inflows searching for the highest yield possible all over the globe. Overvalued currencies changed relative prices in favor of nontradables, including the labor-force being the most outstanding nontradables so overvaluation meant an artificial rise in real wages (Lartey et al., 2008). The link between real appreciation and higher real wages is established through a decline in the cost of imports that enter the consumption basket of wage-earners. A rise in real wages detached from productivity considerations causes aggregate consumption to soar while dragging down the investment growth. Investments take another hit from high interest rates set by monetary authorities waging a war against inflation. As a result, “savings displacement” ensues as foreign savings supplant domestic savings. With capital accounts deregulated, disinflationary policies in emerging markets entice the risk appetite of hot money searching for high yields so strong capital inflows cause local currencies to get overvalued and go mostly to finance high domestic consumption instead of creating extra financial resources to install new productive capacity in recipient countries (Gala, 2008). The real appreciation accompanied by a boom in aggregate consumption makes sure that a balance of payment crisis ending up in a suspension of the rollover of foreign debt is looming on the horizon given the trade-off between foreign and domestic savings. The “growth-cum-foreign savings” strategy would sooner or later hit the wall of solvency constraint, which on its own establishes an upper limit to a country’s indebtedness.

Rodrik et al. (2014) also establish a link between neoliberal reforms and overvaluations with all its concomitant dangers for developing countries’ industries. Neoliberal policy settings such as disinflationary monetary agenda, contractionary fiscal policy guide to stem budget deficits, independence of central banks from government, deregulation of banking system and financial institutions, liberalization of trade regime and capital account, privatization of state enterprises, dismantling of red tape and government subsidies paved the way for growth-reducing structural change through premature deindustrialization. Countries in Latin America and Africa put these policy settings in place when their conditions were not ripe. For example, they liberalized their trade regime while they were deregulating their capital account and implementing disinflation policies. The result was that strong capital inflows facilitated by liberalized capital accounts and allured by disinflationary policies made local currencies overvalued, tightening further the manufacturing sector's already thin profit margins due to the import competition.

As the Feldstein-Horioka puzzle (1980) shows, 95 percent of capital accumulation in OECD countries is financed by domestic savings. Moreover, the evidence suggests that countries with high self-financing ratios grew faster than those that relied more on foreign savings in funding their investments (Aizenmann, et al., 2007). In other words, the strong link between domestic savings and investment was not broken for major industrial countries contrary to the expectations made of financial globalization. In this sense, rich countries advise developing countries a strategy they did not adopt for themselves (Bresser-Pereira, 2002). Then the question crosses one's mind: why do advanced countries recommend developing countries to follow the growth-via-foreign savings strategy?

Bresser-Pereira (2002) offers one explanation as follows: overvaluations followed by a surge in capital inflows would prevent developing countries with comparative advantage of having low labor cost from building up an industrial base which might threaten the primacy of advanced countries in manufacturing. On the other hand, within the context of open capital accounts, overvalued currencies in developing countries allow financiers and multinationals headquartered in developed countries to fully exploit high yields prevailing there as well as eliminate the competitive threat posed by low wage countries.

Magud and Sosa (2010) make a list of shocks which kick off foreign exchange inflows as follows: natural resource booms, surges in capital inflows, foreign aid, and remittances. The accompanying appreciations in real exchange rate then in turn would result in factor reallocation away from manufacturing. They explain how Netherlands underwent deindustrialization following the discovery of natural gas in the North Sea in the 1960s, hence the origin of the Dutch disease concept. The explanation goes as follows: Foreign exchange inflows as a result of natural gas exports acted as a wealth effect and boosted domestic aggregate demand. Given that law of one price applies to tradable goods while price of nontradables clears in domestic market, relative price of nontradables went up due to stronger domestic demand, appreciating the Dutch guilder in real terms. The real appreciation weakened the competitiveness of manufacturing tradable goods, leading to a "resource-based deindustrialization".

Eichengreen (2008) suggests that the reason why capital inflows tend to appreciate real exchange rate in recipient country is the central banks' limited ability to sterilize capital inflows. Prasad et al. (2007) find that there is strong evidence for capital inflows contributing to overvaluations and that this effect is stronger for nonindustrial economies. Hence, those developing countries with little manufacturing base is more susceptible to overvaluations in their currencies caused by capital inflows. In line with the rest of literature, they also claim that overvaluation causes a decline in the profitability of exports. Their regression output suggests that if a country's real exchange rate is overvalued by one standard deviation which is approximately equal to 24 percentage points than that of peer countries, then its exports industries record a growth rate less than 1.4 percent compared to other sectors in this country relative to its peers. In other words, overvaluation slows down relative growth of exportable industries when compared to other countries with competitive currencies. Yepez (2021) shows that accommodative U.S. monetary policy leads to surges in capital flows into emerging market and developing countries, overvaluing their local currencies and shrinking their tradable output share.

Last but not least we want to look at a less discerned aspect of financial globalization. Financial globalization has presented many conundrums and one of them is the investment income flows from developing to developed countries.

The quickening pace of financial globalization in the 1990s has been felt most in the exponential growth of cross border private capital flows in developing world. According to UNCTAD (2019), external assets and liabilities of developing countries were 16 times and 8 times as big in 2018 as they had been in 1995. The capital flows into developing world since 1995 have contributed to the accumulation of up to 95 percent of gross external assets and up to 90 percent of gross external liabilities as of 2018. In the light of the 1997 crisis in East Asia and its repercussions in Russia in 1998, many developing countries decided to build up an arsenal of foreign exchange reserves since the unexpected fluctuations in capital flows inflicted serious damage on their economy, destabilizing their currencies and plunging them into recessions. The policy of accumulating foreign exchange reserves as a buffer against sudden stops in capital inflows or even capital-flow reversals played a great role in the expansion of their international investment position.

As the size of gross assets and liabilities has swollen, international investment income on external stocks has taken on a new importance as an entry into the current account of developing countries. According to UNCTAD (2019), since the beginning of new millennium through 2018, 16 developing countries in their sample have paid annually approximately a net investment income payment of $440 billion on average corresponding to 2.2 percent of their GDP. This amounts to a significant drain of capital which cannot be ignored anymore. The investment income flows from developing countries have reached to such a point that it became an ever significant source of financial leakage from those countries' balance of payments. We can safely conclude that financial globalization did not help ease the financing constraints of developing countries but aggravated them. It meant a net outflow of financial resources which might otherwise have been invested in productive capacity in developing countries.

What is striking is that all of the leading developing countries runs a deficit in their net international investment income without any exception in the period 1995-2018. The explanation why developing countries transfer a net investment income abroad might be that they hold a net debtor status as indicated by their negative net international investment position. This, however, does not reflect the whole truth because, for example, China and Russia also incurred a negative net international investment income, even though they have had a positive net foreign asset position. Throughout the period between 1995 and 2018 China and Russia recorded a positive net international investment position equivalent to 11.3 percent and 5.1 percent of their GDP, respectively. But, the corresponding figures for net international investment income as a share of GDP were -0.7 percent and -2.3 percent respectively. In other words, even though their gross foreign assets exceed their gross foreign liabilities, the revenue on these gross assets has always been less than the payment on their gross liabilities. Even being a creditor nation could not prevent developing countries from paying a net investment income transfer abroad.

On the other hand, between 1995 and 2018 developed countries run surpluses in their net international investment income with the exception of the United Kingdom which incurred a negative net foreign asset position to the tune of 8.9 percent of its GDP. It requires no explanation why they earned net investment income for Germany and Japan since their excess of gross foreign assets over gross foreign liabilities stood at

13.3 percent and 42.2 percent of their GDP, respectively. However, despite being a net debtor nation as indicated by its foreign assets being less than its liabilities by a stunning 23.2 percent of its GDP the United States managed to receive a net international investment income corresponding to 0.7 percent of its GDP. The United Kingdom also was a net recipient of investment income before the Great Financial crisis even though it had a negative net international investment position hovered at 8.6 percent of its GDP. But the things changed a bit for worse after the global crisis. Yet, we can conclude that developed countries, regardless of whether they hold a creditor or debtor status, derived a net international investment income throughout the period globalization peaked.

The puzzle can be put as follows: even though the United States, an archetype of advanced countries, is a net debtor vis-à-vis the outside world, it earns a net investment income while the China, the most successful developing country, pays off a net income income despite being a creditor nation through its large current account surpluses. Here yield differentials may largely explain this puzzle. However important the difference between gross foreign assets and liabilities might be, their composition matters even more (Norfield, 2016; Akyüz, 2018; Hausmann and Sturzenegger, 2007). The developed countries' asset composition is heavily leaned on equity like foreign direct and portfolio investments which are associated with high returns on average while their liabilities largely consist of debt like bonds, deposits, and foreign exchange reserves which bear little to none interest. The opposite is the case with developing countries. They borrow in high-yielding assets like equity investments while they invest in low-yielding assets like deposits, bonds, and foreign exchange cash reserves. Developed countries also enjoyed the exorbitant privilege of being owners of hard currencies and of running quite a low default risk on their sovereign debt unlike the case with developing world. So they could be able to borrow at low rates to invest in high-yielding assets.

All in all, financial globalization has seen to it that developing countries transferred a net investment income to developed countries. According to this result, developing countries has been far from being the winners of globalization from a financial point of view.

3.3 Demand-side Approaches to Deindustrialization

As we have made clear in our exposition, the idea of differential productivity growth as a prime driver behind deindustrialization is not uncontested. Demand-side approaches to deindustrialization stress the significance of changes in consumer preferences along the economic development path.

Foellmi and Zweimüller (2008) construct a model in which structural change tracing the rise and fall of manufacturing industry originates in non-linear Engel curves where nonhomothetic consumer preferences play a decisive role in the hump-shaped relationship between share of manufacturing industry in employment and economic development. The model postulates that different income elasticities of demand across sectors drive structural change process as households with hierarchic preferences cause changes in the composition of aggregate demand over time. At the initial stages of economic development, manufactures start out as luxury goods but they end up being necessities when the economy enters into a mature state. As income per capita reaches a certain threshold it starts to reduce the elasticity of manufactures with respect to income and let services displace them as luxuries. Therefore, the changes in the composition of aggregate demand in favor of services along the development path subjects the manufacturing sector to an inverted U-shaped transformation. Hence deindustrialization can be explained by the low income elasticity of manufactures compared to services in mature economies.

Buera and Kaboski (2009) attribute the rise of services at the expense of manufactures mainly to nonhomothetic preferences. Considering the evolution of value-added share of agriculture, manufacturing, and services for the US throughout the period between 1870 and 2000, they find that a sharp rise in the share of services coincides with a steep decline in the share of industry after 1960. It means that from 1960 on the relative share of services rose at a faster rate than the relative price of services to industrial goods did. They suggest that only a large income effect towards services can explain why the relative share of services increased at the same time as the price of services has risen relative to industry. The large income effect establishes that household hold nonhomothetic (non-quasiconcave) preferences when the income level goes to infinity so that they consume more of things with rising prices.

Matsuyama (2009) also objects to explanations based on manufacturing industry's higher productivity growth for its relative decline. The increase in the productivity of labor in manufacturing industry works out its impact on employment through two separate channels in an interdependent world. The income effect of greater output per labor means a lower income elasticity for manufactures as compared to services due to nonhomothetic preferences. Apparently, the income effect has a negative effect on manufacturing employment. But, on the other hand, countries achieving productivity gains in manufacturing industry secure a competitive edge over their rivals on the world market. Consequently, a shift in comparative advantage takes place for countries with higher productivity in manufacturing, and they can capture a greater share of world market for their industries. As a result, the trade effect works in favor of manufacturing employment. From a global perspective for manufacturing sector, an increase in manufacturing labor productivity in one country does not necessarily lead to a decline in its employment share in that country. To the contrary, it may enhance manufacturing employment in the country experiencing a productivity growth since comparative advantage shifts toward that sector. This, however, does not exclude the possibility of manufacturing workers in other countries losing their jobs due to these shifts in comparative advantages. All in all, the differential productivity growth may not explain deindustrialization because the effect of a rise in labor productivity on manufacturing employment is ambiguous.

Loungani et al. (2018) combine differential productivity growth with nonhomothetic preferences as a way of explanation for deindustrialization. With an elasticity of substitution between manufactures and services which is less than one, productivity gains in manufacturing sector fuel relative demand for services as the income elasticity of services increases at higher per capita income levels (also Swiecki, 2017).

Dasgupta and Singh (2006) rules out the so-called change in demand composition as an explanation for deindustrialization. They argue that income effect is more or less offset by substitution effect so growth rate of demand for manufactures and services does not vary a great deal. As is well known, the contribution of income effect to deindustrialization relates to nonhomothetic preferences and nonlinear Engel curves. Income elasticity of demand for services becomes greater than that for manufactures as per capita income rises along the economic development. On the other hand, substitution effect stems from differential productivity growth. The prices of manufactures relative to services decline since productivity grows faster in manufacturing than in services (Howes and Singh, 2000). Hence, while the income effect favors services sector, the substitution effect works in favor of manufactures. Dasgupta and Singh claim that they more or less cancel out each other so no major change in consumer preferences could follow.

Another demand-side model developed by Foellmi and Zweimüller (2011) questions whether a widening income inequality drives countries into deindustrialization. They construct a model where the economy consists of three sectors, i.e., subsistence, mass manufacturing, and exclusive goods, the latter two of which represents the formal sector and population is made up of poor and unskilled as well as rich and skilled. The poor can be employed in the subsistence sector, mass production, and the exclusive sector while the rich are entrepreneur class in the exclusive goods production and mass production. Monopolistic competition applies in the exclusive goods and mass production sectors, implying the markup pricing in both. The price elasticity of demand for exclusive goods is assumed to be less than that for mass manufactured goods. Therefore, the demand curve in the mass production sector is flatter than that in the luxury sector. Consequently, the mark-up varies in inverse proportion to the price elasticity of demand so that higher markups prevail in the exclusive goods sector than mass production sector. On the other hand, the production function in which the only factor of production is labor is identical for these two sectors. Non-homothetic preferences hold such that the poor can consume only mass production goods or the subsistence goods if they are employed at that sector while the rich can consume only exclusive goods. All other things being equal, a more skewed income distribution against the poor reduces the demand for mass production along with their income. Alternatively, a more unequal income raises the demand for exclusive goods sector since the relative income of those who can afford to buy them has risen. The mass production sector sees a contraction in terms of output and employment while the exclusive goods sector records an expansion in both accounts. Since markups are different across the sectors, the expansion in the exclusive sector will be more than offset by the contraction in manufacturing sector. The manufacturing sheds more labor than the exclusive sector hires, and loses more output than the latter gains because markups are higher in the exclusive goods sector. The model can also be manipulated to assume that mass manufacturing is labor intensive and the exclusive sector is capital-intensive (Grabowski, 2017). As a result, a larger decline in mass manufacturing occurs than would by suggested by a mere deterioration in income distribution. In the same vein, an increase in inequality in developed countries means a reduction in the size of export markets for manufacturing sector in developing countries. Grabowski (2017) provides evidence for the negative impact of a deteriorating income inequality on industrialization in some developing countries such as Egypt and Indonesia (Moustafa, 2006). He concludes that premature deindustrialization coincided with an increase in inequality in these countries.

We witness a recent great shift in the literature on the nexus between industrialization and inequality. In his seminal paper, Kuznets (1955) found an inverted U-shape curve when inequality plotted against income per capita. The economic logic behind the geometry postulates that the structural transformation involving the shift of economic resources from agriculture to manufacturing comes with a rise in inequality first, and then a fairer income distribution could be obtained at a high stage of industrialization. His argument is based on the assumption that agriculture is a low-income sector with low inequality within itself while industry generates high income with huge income disparity. The reallocation of resources from agriculture to industry initially involves a deterioration in income distribution. The inequalities stemming from the difference between sectoral incomes decline and those originating within the sectors increase as the industry encompasses a higher share of population. At a certain point, the decline in between-sector inequality becomes more pronounced than the increase in within-sector component so we could obtain the usual hump-shaped curve.

However, recent empirical evidence casts large doubt on this argument (Baymul and Sen 2020**;** Ravindran and Babu 2021). First, in the era of hyper-globalization, the nature of structural transformation many developing countries have undergone is radically changed with the premature deindustrialization phenomena. It is shown that resources have increasingly transferred from agriculture to services, not to manufacturing industry at the early stages of economic development for many developing countries, a pattern radically different from the Kuznets' model. Second, industrialization is specifically associated with a fairer income distribution in contrast to the Kuznets' argument. Given the prevalence of informal enterprises and the wide range between low and high end of the pay-scale in services sector, manufacturing could be designated as the sector with lower within-sector inequality. It is a formal sector where its labor-force could be protected via the minimum wage regulations, trade unions, collective bargaining, etc. Industrialization also sets in motion forces towards better governance with the growth of organized working class and its accompanying political strength (Acemoglu and Robinson 2002). On the other hand, services sector carries great variability with respect to remuneration and largely involves informal employment with low-to-none protection for workers. Hence, we could establish a positive association between an amelioration in income distribution and industrialization (Sumner 2017; Sarma et al. 2017; Rydzck, 2013).

3.4 The Role of Institutions

The literature is unequivocal about the importance of institutional quality in supporting the industrialization efforts of developing countries. The development of manufacturing industry is quite sensitive to the institutional quality since it largely involves contract-intensive production where contract enforcement and equitable protection of rights become an essential ingredient into the productivity gains. The well-established nexus between institutional quality and economic growth can be formed by the intermediation of manufacturing industry (Rodrik 2008). Hence, complex transactions around infinitely many backward-forward linkages, and the production of highly differentiated goods requires a well-functioning regulatory system in the absence of which the manufacturing industry might greatly suffer from inefficiencies as a result of asymmetric information inherent in thinner markets. In other words, since the manufacturing industry operates on a vast production network with infinitely many backward-forward linkages, it can be singled out as the most vulnerable sector to the notorious holdup problems, and any failure in contract enforcement. To sum it up, it could be argued that the manufacturing is more sensitive to institutional quality than any other sector so the link between growth and institutions mainly works through the mediation of manufacturing industry (Dollar and Kidder 2017, Rodrik 2008). As a result, better governance as captured by an improvement in institutional quality disproportionately benefits the manufacturing industry which is a contract-intensive sector by clearing most of asymmetric information problems in the presence of strong protection of rights and credible contract enforcement (Dollar and Kidder 2017).

The developing country context is also consistent with the fact that institutional quality and the related economic policy framework play great role in their industrial performance by promoting a stable macroeconomic environment (Martorano et al.

2017; Totoum et al. 2019). And poor institutions hamper the efforts at creating a robust manufacturing base by discouraging investments (Beji and Belhadj 2016).

4. WHY IT MATTERS? THE SIGNIFICANCE OF MANUFACTURING INDUSTRY FOR DEVELOPING COUNTRIES AND CONSEQUENCES OF PREMATURE DEINDUSTRIALIZATION

Since we have extensively dwelt upon the documentation of premature deindustrialization and its causes, a question crosses one's mind: Is the loss of manufacturing share in output and employment something to be worried about for developing countries? Many neo-classical growth models describe economic growth as "sector-indifferent" and "activity-indifferent" (Palma, 2010). According to this view, deindustrialization does not imply any hindrance to growth. On the other hand, many economists challenge the neo-classical growth models, assigning a priority to manufacturing industry as an engine of economic growth. In this chapter, we will explore the importance of manufacturing industry for developing countries and the consequences of premature deindustrialization by particularly examining the question of whether services sector could fill the vacuum created by the relative loss of manufacturing industry in many developing countries.

In the literature, manufacturing industry is favorably looked upon by many economists. A strong and diversified domestic manufacturing base has been, and still is, of strategical importance to successful economic upgrading. Castillo and Neto (2016) and UNCTAD (2016) give a succinct summary of the economic literature on the favorable role manufacturing industry plays in the development path. Nurkse (1953) and Hirschman (1958) singles out manufacturing sector as the key to economic development due to its forward and backward linkages. Manufacturing industry generates backward and forward linkages with the rest of economy by providing demand for production of inputs or supplying essential inputs to be used up in other sectors. New investments in capacity expansion in one manufacturing subsector usually tend to lead to additional investments in other sectors because the feasibility or profitability of the latter may depend upon the former (Rodrik, 2004). With Young (1928) and Rosenstein-Rodan (1943), increasing returns apply for manufacturing activities. Due to the differential technical progress, manufacturing sector operates as an engine of productivity growth. By introducing new skills and technological learning, manufacturing industry helps other sectors enhance their productivity level. For Kaldor (1960), manufacturing is unique with its direct and spillover effects where efficiency gains accruing to manufacturing sector are quite easily spread across the whole economy. Cornwall (1977) states that manufacturing sector presents special opportunities for embodied as well as disembodied technological progress. Thirwall's growth model establishes that a rise in the share of manufactures in total exports lifts up the long-run growth trajectory (Thirwall, 1979). In addition to having static economies of scale where an increase in cumulative output involves a reduction in unit production costs, manufacturing industry stands to benefit from exploiting dynamic economies of scale where the introduction of technologically sophisticated processes is fused with the development of know-how and skills through learning by doing (Szirmai, 2012). The incessant improvement in production techniques, organizational schemes, and product quality via technological upgrading and skill acquisition by manufacturing firms enables countries to move up the income ladder (Haraguchi et al., 2017). Berger (2001) claims that the manufacturing industry is key to sustainable economic growth since the next wave of technological innovations will be intricately bound up with production processes like solar energy (Cherif and Hasanov, 2019). Recently, Rodrik (2013) comes up with an important finding that labor productivity in manufacturing industry exhibits convergence with the world frontier. He suggests that developing countries with a higher share of manufacturing industry manage to grow faster compared to those countries with little manufacturing industry. The catch-up with the technological frontier in terms of productivity is greater in manufacturing than in services. The farther the national manufacturing industry is away from the world labor productivity frontier, the faster its labor productivity growth will be. Moreover, what is more interesting is that the tendency towards convergence in manufacturing labor productivity is not conditional on institutional quality, domestic policies, geographical factors since the country-specific fixed effects are abstracted away from the baseline model.

According to Rodrik (2013), manufacturing industries are special in the sense that they tend to show (unconditional) convergence in terms of labor productivity. Even though convergence in terms of per capita income has yet to assert itself, manufacturing sector presents a means for developing countries with which they could be able to lift their overall productivity level and close the gap with the global frontier. Those local industries that start further away from the technological frontier and hence at a lower productivity level experience faster labor productivity growth. According to Rodrik's baseline regression results which cover 118 countries, there is statistically significant convergence in labor productivity in manufacturing subsectors. The coefficient of beta convergence which relates compound annual growth rate of labor productivity in manufacturing industries to initial manufacturing value added per worker is around 2.9 percent, which is unusually large, meaning that manufacturing industries that have labor productivity of only one tenth of the technological frontier, which characterizes the lowest 20 percent of the subsectors in Rodrik's sample, tend to increase their labor productivity by 6.7 percent per year on average (that is, simply the product of 0.029 and ln[10]). And this convergence rate seems to be quite stable over different time horizons. The convergence also has the modifier "unconditional" before itself since the regression model which takes a set of industry times time period fixed effects into account does not incorporate any country fixed effect dummy variable that captures the specific effects of institutions, policies, and geography on the growth rate of labor productivity. With the regression model being augmented with country fixed effects, then the conditional convergence rate goes up to as high as 5.4 percent, almost doubling the unconditional convergence rate. This finding provides evidence for the favorable effect of policies, institutions, and geography on the growth rate of labor productivity in manufacturing industries. In other words, country-specific factors which affect the initial productivity level may boost the pace of convergence in manufacturing sector.

We should in passing note that the basic results of the regression model are founded on solid statistical foundations. Manufacturing industry is disaggregated at a two-digit subsectors level so that the results are robust to the so-called composition bias where a dominating industry for an individual (usually small) country distorts the picture. To avoid errors of measurement in the independent variable that is nominal labor productivity for each industry, which may yield upwardly biased estimates, Rodrik (2013) models a global inflation rate for each individual industry with an idiosyncratic error term regardless of what country these industries belong to, based on the assumption that manufacturing is a tradable sector where prices clear in the world market. In other words, Rodrik makes sure to employ appropriate statistical techniques to get around both composition and attenuation bias.

Lastly, Rodrik (2013) poses the question of how an unconditional convergence in manufacturing sector might be compatible with the absence of a catching-up process in terms of GDP per capita. We have already seen that globalization has not lived up to expectations as an era in which a general trend to convergence comes to prominence. Rodrik (2013) proposes the answer that there is no general tendency to convergence outside the manufacturing industry. Moreover, manufacturing industry in many poor countries is too small to make a difference when it comes to closing the per capita income gap with the world frontier. Rodrik also points out to the absence of growth-enhancing structural change in developing countries where resources are reallocated from low to high productivity sectors.

Felipe et al. (2019) specifically associate industrialization with becoming a rich country. According to the empirical findings of their survival and separation analysis, industrialization in employment precedes a country's upgrading into the category of rich country. There is a direct link between having had a manufacturing share of employment over 18 percent and entering the rich club. Therefore they conclude that the rich countries are in general also industrialized countries.

In the first chapter, we have already shown that the decline in the share of manufacturing in employment and output went hand in hand with the rise of services for all developing countries with notable exceptions such as those in the East Asia. Now we should deal with the problem of the exodus from manufacturing to services and its historical and theoretical consequences. Can services really do the trick when it comes to replacing manufacturing as a prime driver of economic growth and development?

We should start by the fact that the hopes of high-technology services-led growth has still yet to materialize in developing countries. Especially given the employment considerations, high-tech services failed to replace manufacturing industry as a generator for growth-enhancing, high productivity jobs in Latin American countries such as Brazil, Argentine, and Chile. Instead low productivity services took the place of manufacturing sector in its employment share. Castillo and Neto (2016) state that in the period between 2003 and 2013 the share of low productivity services such as personal services in total value added increased while that of high productivity services like post and telecommunications decreased in Brazil. Likewise, the rise in the share of services between 1993 and 2010 in Argentine largely depended on low tech services such as wholesale, retail and repairs, real estate and rental activities. Chile also followed the suit. Wholesale, retail and repairs was the pioneer sector behind the expanding employment share of services, assisted by hotels and restaurants.

Neither was Africa the exception. Almost in every case the reallocation of resources away from manufacturing towards services brought an allocative inefficiency in African countries. Especially when manufacturing industry lost its momentum to generate employment in Africa, it tended to be low productivity services which had taken up the slack (UNCTAD, 2015). Ethiopia, Ghana, Kenya, Malawi, Senegal, Tanzania, and Zambia saw wholesale and retail sector has performed best in terms of increasing its employment share in two decades after the new millennium (Loungani et. al., 2018; Enache, Ghani, and O'Connel, 2016).

The point is that services cannot lead a successful structural change requiring a radical transformation of resources from low to high productivity sectors since the capacity of high-tech services to create jobs is quite fairly limited. The experience of India proves the point. While India adopted services-led development strategy and made some important gains in terms of economic growth, it is seen that high-tech services were far away from absorbing the vast sources of labor released from both agriculture and industry (Loungani et. al., 2018). Indian economy attained an annual growth rate of GDP of 4.8 percent between 1990 and 2015 but it still had a long way to go since GDP per capita in current dollars was still very low, hovering around $1,600 as of 2015 according to World Bank, World Development Indicators. Atolia, et.al. report that despite large efforts at leading economic growth by encouraging high-tech services after 1991 liberalizing reforms, employment growth in those high tech services like communication and information technologies recorded a meagre rise of 1.28 percentage points while employment in other services like construction, wholesale and retail, and transport and storage increased by 4.9 percentage points. Given the fact that the productivity of these other services made up only one-third to one-fifth of the productivity of high tech services, the expansion in the employment share of services sector was led by low productivity services in India since 1991.

It is, however, important to bear in mind that we should be very careful when labelling services as low or high productivity because productivity measurement in services, especially in the so-called FIRE sectors, finance, insurance, and real estate, suffers from an exposure to price fluctuations, which makes immensely hard to gauge the sectoral performance (UNCTAD, 2016). It is true that finance, insurance, real estate, and business services employ high-skilled labor force but their value added usually represents not so much their productivity as price changes. Transport, storage and communications comes second to finance, insurance, real estate, and business services in terms of productivity level but this sector can be regarded as consisting of activities manufacturing firms has increasingly outsourced to special providers. However, Cherif and Hasanov (2019) adopt a skeptical approach to labelling most of the services included in transport and communications and financial intermediation and business services as sophisticated sectors according to their measure of sophistication based on the research and development intensity and patents issued.

Now we can come to the heart of the subject matter: What role can services play in economic development process? Services are too heterogeneous to be the pioneer of economic development. Services largely encompass a broad spectrum of economic activities from low productivity sectors such as tourism to high productivity sectors like information and communication technologies. The contribution of low productivity services to economic upgrading can be expected to be little to none at all. Let's consider tourism. It mainly consists of low productivity services such as trade and hotels/restaurants. Even though it requires a sizable physical infrastructure investment in the form of hotels, restaurants, roads, airports and so on, tourism has weak potential to improve overall productivity growth and is not conducive to sustainable productivity gains. In their empirical work which includes 127 countries in the period 1980 to 2002, Arezki et al. (2009) found that when the average of tourism receipts as a share of exports of goods and services exports increases by one standard deviation which is 8 percentage points, it leads to a rise in the annual growth rate by approximately 0.5 percentage points per year. The gains to be appropriated from specializing in tourism seems quite meagre in terms of growth. Though it relies more on external demand so it has the ability to generate foreign exchange earnings to domestic economy, tourism has mainly linkages to the nontradable sector. Moreover, there is very little space for introducing new goods and developing new technologies in the tourism sector (Cherif and Hasanov, 2019). Enjoying the sun and sand or eating delicious local food is less likely to be improved, for example. Therefore, whatever productivity gains have been made could not be sustained for long. On the other hand, high tech and high productivity services usually have a symbiosis with manufacturing industry.

For short, we can claim that services cannot substitute for manufacturing but instead complement it. The seemingly high significance of services sector largely owes to the contracting out of manufacturing firms in the first place, that is, some activities previously undertaken by manufacturing firms like product design and data processing are subcontracted to specialized services companies. The importance of services as revealed by its share in total value added is increasingly hinged upon the acceleration of manufacturing activities (UNCTAD, 2016; Andreoni and Gregory, 2013; Di Meglio et al., 2015). The coexistence of high productivity services such as product design, research and development, information and communication technologies with manufacturing sector needs no further explanation because they supply high valued inputs to industry. Manufacturing also contributes to the rise of services in a more subtle manner. By enhancing overall productivity level, the accompanying high per capita income levels support demand for a broad range of services (UNCTAD, 2016).

Since we have seen that services can play only a complementary role in helping developing countries to complete their development goals, we can now assess the effects of premature deindustrialization.

The premature deindustrialization is associated with allocative inefficiency. Deindustrialization and services-led growth strategies in developing regions usually meant a slow-down in overall productivity growth, which may explain to a great extent the divergent patterns of economic growth since the start of recent globalization era. Using Groningen Growth and Development Center database, Rodrik et al. (2014) developed a methodology to measure the impact of structural change on the change in aggregate productivity level. Here, the structural change refers to a reconfiguration of resources across different economic activities over time. Since we have already described the general pattern of structural change for some developing regions in the first chapter, then we can learn a lot about the consequences of premature deindustrialization by focusing exclusively on the contribution of structural change to overall productivity growth.

Rodrik et al. (2014) splits the change in the level of labor productivity in an economy up into two components: within effects and between effects. The within effect explains that part of economy wide productivity growth accounted for by efficiency gains within sectors through capital accumulation, technological progress, or rationalization of operations such as reduction of misallocation across production units. The between effect basically captures the change in the labor productivity due to a shift in labor-force from low to high productivity sectors. In particular, they use the following decomposition method:

$$\varDelta Y_t = \sum_{i=n} \theta_{i,t-k}\, \varDelta y_{i,t} + \sum_{i=n} y_{i,t}\, \varDelta \theta_{i,t} \tag{4.1}$$

where Y_t and $y_{i,t}$ denote the overall and sectoral productivity level, respectively and $\theta_{i,t}$ represents the employment share of i^{th} sector at time t while $\varDelta$ is the difference operator which measures the change in productivity or employment share between t and t-k.

The first term in the decomposition refers to the within effect which is simply the weighted sum of sectoral productivity growth with the employment share at the beginning of time period being used as weights and captures the contribution of each sector's productivity growth to overall productivity growth. The second term in the formula can be defined as the between effect since it is just the inner product of sectoral productivity level at the end of time period and the change in the employment share of that sector between time t-k and t. The between effect thus quantifies that part of a change in overall productivity level explained by reallocation of labor force across different sectors. Rodrik et al. (2014) prefer to call this component as structural change term to highlight the effect of changes in employment structure along the development path on overall productivity performance. If labor force moves from low productivity sectors like traditional agriculture to high productivity sectors like modern manufacturing as would be the case with catch-up industrialization, then structural change is expected to make a positive contribution to overall productivity growth. If, on the other hand, labor force moves away from high productivity industrial sector to low productivity services like trade, hotels, and restaurants, then structural change could be crippling the productivity growth in general.

However high productivity growth might be within manufacturing industry as a result of opening to free trade, a shrinking share of manufacturing employment would limit the contribution of structural change term to overall productivity growth. We have already seen that under open economy conditions, manufacturing plants in developing countries underwent what Rodrik and McMillan refer to as industry rationalization where least productive factories are shut down and those surviving the import competition discharge the so-called excess labor. But these productivity gains achieved through rationalization of operations are to a considerable extent offset by negative structural change when displaced workers find employment in low productivity sectors. To be more precise, premature deindustrialization would drive the between effect into negative territory. The problem gets worse when labor thus released from manufacturing goes unemployed but the model above, by construction, does not incorporate this possibility. Since unemployment is left out of computations, the measured structural change term should be looked upon as a lower limit given the rise of unemployment rate in prematurely deindustrializing regions.

Table 4. 1 : Decomposition of overall productivity growth, 1990-2005. **(**Rodrik, 2014).

	Labor Productivity Growth (%)	Component due to	
		Within (%)	Structural (%)
Latin America	1.35	2.24	-0.88
Africa	0.86	2.13	-1.27
Asia	3.87	3.31	0.57
High Income	1.46	1.54	-0.09

For each developing region, productivity gains within sectors are distributed within a narrow interval ranging from 2.1 percent to 3.3 so the within effect does not make that much difference when it comes to explaining the inferiority of Latin America and Africa compared to Asia in terms of labor productivity growth. Latin America and Africa lagged behind Asia in their bid to increase labor productivity because the structural change term turned heavily to negative between 1990 and 2005. A decline in labor productivity of 0.88 and 1.27 in Latin America and Africa respectively due to the reallocation of labor away from manufacturing considerably chipped away at efficiency gains within sectors. We can conclude that in Latin America and Africa globalization led to premature deindustrialization and the latter brought a growth-reducing structural change.

We find similar findings in the work of Timmer et al. (2014). They use a different decomposition method to further analyze the reallocation effect of labor across sectors on productivity growth.

$$\Delta P = \sum_{i} \Delta P_i S_{i,0} + \sum_{i=n} \Delta S_i P_{i,0} + \sum_{i} \Delta P_i \Delta S_i \qquad (4.2)$$

where $S_{i,t}$ and $P_{i,t}$ stand for sectoral share of total employment and sectoral productivity of labor at time t, respectively while Δ is the difference operator which measures the change in productivity or employment share between initial and final period.

While the first term represents the within effect which captures the productivity gains within sectors over time, the second and third terms reflect the contribution of static and dynamic reallocation effects. The static reallocation effect turns positive when the composition of employment changes in favor of high productivity sectors. The dynamic reallocation effect, which is calculated as the cross product of sectoral productivity growth and changes in employment share at that sector, becomes positive when workers stampede into sectors with above average productivity growth. The dynamic losses occur when the interaction term in the decomposition of overall productivity growth capturing the joint effect of changes in sectoral employment share and productivity growth turns negative. In other words, while static gains involve differences in productivity levels, dynamic gains have to do with differences in productivity growth rate across sectors.

The sign of the interaction term allows us to assess whether the expanding sectors in terms of employment share exhibit higher or lower productivity growth relative to the contracting sectors. When expanding sectors perform worse than shrinking sectors with respect to productivity growth, then dynamic losses ensue accordingly. To put things in perspective, we can claim that if those sectors whose employment share has recorded a rise since the start of globalization like services exhibit a poor productivity performance compared to the contracting sectors such as manufacturing industry, then overall productivity growth incurs dynamic losses.

Table 4. 2 : Decomposition results for 1990-2010, %. (Timmer, 2014).

	Average annual productivity growth	Within	Between static	Between dynamic
Latin America	0.9	1	0.9	-1
Sub-Saharan Africa	1.8	1.7	1.6	-1.5
Asia	3.6	3.1	0.6	-0.1

We can conclude that with the pace of globalization quickening after 1990 the whole developing world followed the same pattern with varying degrees. It strikes at the first sight that Asia incurs slight dynamic losses but manages to experience quite a high average annual productivity growth rate of 3.6 percent by means of an extraordinary contribution of within component a modest boost from static gains.

On the other hand, Latin America and Africa sustained significant dynamic losses hovering around 1.0 and 1.5 percent per year, respectively while static gains more or less compensated them. Given that premature deindustrialization was a widespread phenomenon in Latin America and sub-Shoran Africa during this period, expanding services sector and shrinking manufacturing sector may have been behind the static gains and dynamic losses. Especially, a reallocation of labor from agriculture to services seems to have led to static gains in these regions because the direction of movement runs from below average to above average productivity level sectors. On the other hand, services sector is known for its lack of technological dynamism compared to manufacturing industry so an exodus of labor from the latter to the former is expected to result in dynamic losses. Globalization seems to have raised labor productivity level by moving labor from agriculture to services but stunts its growth rate by moving labor from manufacturing to services.

Castillo and Neto (2016) also corroborate the pattern of structural change we have delineated for several Latin American countries. In Brazil and Mexico, a rise in the share of services in total employment has been accompanied by a negative contribution of structural change to labor productivity growth after 1975. Stricken by poor productivity gains within sectors going hand in hand with allocative inefficiencies as reflected in negative structural change term, Argentine even recorded a negative rate of labor productivity growth between 1975 and 1990. In the subsequent periods, Argentine managed to turn within growth to positive but still suffered from a negative structural change term. Chile followed the suit. The change in its labor productivity due to a shift in the composition of overall employment turned out to be negative because labor moved towards sectors with lower productivity as it faced premature deindustrialization. As a whole, Latin America has been in the grip of growth reducing structural change since the mid-1970s.

5. EMPIRICAL MODEL

In this chapter we construct our model and present regression output along with their economic interpretations. Since the primary interest of our research revolves around the detrimental effects of overvaluation on industrialization in developing countries, we start with the ways real exchange rate is measured. There are two theoretical approaches to determining the equilibrium exchange rates. One is fundamentals-based approach, and the other is purchasing power parity approach. After briefly defining the former, we will move on to detailing the construction of our overvaluation index. Then we will be ready to develop our regression model which seeks to explain premature deindustrialization. Econometric methodology, data sources, and regression outputs will be clearly explained along with the diagnostic tests. We will be only briefly discussing possible endogeneity problem in our model since we will exclusively deal with it in the next chapter thoroughly.

We will first discuss the construction of our main variable of interest, that is, the overvaluation index, and before moving on to developing our baseline regression model, we establish an empirical causality from capital flows to local overvaluations. After interpreting the main results of the baseline regression model, we would like to carry out a comprehensive robustness check regarding the empirical findings from the baseline model.

5.1 Measuring the Real Equilibrium Exchange Rate

There are two ways of measuring the equilibrium real exchange rate; the fundamentals based approach and purchasing power parity based approach. We start with laying out the basics of fundamentals based approach. Then we will be enlarging upon the purchasing power parity or relative price based approach adopted in this work.

The starting point for the fundamentals based approach is that an equilibrium real exchange rate is the one that would not yield output gap and get the country run current account imbalances (for an extensive literature review and its empirical applications; Salto and Turrini, 2010; Williamson, 1994; Stein, 1994; Siregar and Rajan, 2006;

Isard, 2007). In other words, the fundamentals based approach sets the real equilibrium exchange rate as the one that would achieve both internal and external balance alike. Internal balance is mostly about closing the output gap so that an economy could sustain national income growth in consistent with its potential based on physical factors such as productive capacity, labor force, and so on. External balance, on the other hand, involves sustainable current account balances. In this regard, external balance can be maintained when current account balances go in synch with long term finance account flows. An additional requirement can be made about the stabilization of capital stock and foreign debt stock in the balanced growth path. In sum, the equilibrium real exchange rate is set against a benchmark share of current account balance to national income (for literature, Rodrik, 2008; Aguirre and Calderon (2005); Razin and Collins, 1997; Elbadawi, 1994). This predetermined current account balance as a share of GDP should of course be compatible with underlying economic fundamentals. When the actual current account balance, once stripped of all the transitory and temporary factors, deviates from its equilibrium level, then there arises a need for necessary adjustments in real exchange rate to get it return to its benchmark value. Hence, the real equilibrium exchange rate becomes equivalent to the rate which ensures the equilibrium current account balance.

We should note that the equilibrium current account balance can be defined in various ways, depending on the context as well as the availability of data. One definition involves stabilizing the net foreign assets as a percentage share of national income. So the current account balance which sees to it that net foreign assets / gross domestic product ratio settle on a stable path can be determined as a benchmark value for it. Another definition puts more weight on long term economic fundamentals where the equilibrium current account balance can be estimated by running regressions on a set of explanatory variables. These variables are usually selected with regard to the saving-investment gap, trade deficit or surplus, net international investment flows. To cite a few of them, these independent variables in general consist of general government budget balance as a percentage share of national income, net foreign asset – gross domestic product ratio, old age dependency ratio, the level and growth of real income per capita, terms of trade, international interest rates, productivity growth, and so on (Gala, 2008; Cottani, et. al., 1990).

To put things in perspective, we want to briefly mention the possible effects of changes in these fundamentals on the equilibrium real exchange rate hypothetically. When a government runs budget surpluses, domestic savings are augmented so the contractionary fiscal policies usually ameliorate current account balances. On the other hand, a budget deficit tends to appreciate the real exchange rate, which in turn gives rise to a deterioration in current account balance because the resulting government expenditure spree largely falls on nontradables. A huge pile of net foreign assets is generally built upon cumulative current account surpluses and these assets bear international investment income and improve current account balance in their turn. In this context, trade deficits can be regarded as economically sustainable and viable as long as they are financed by real returns on net financial assets. An increase in old age dependency ratio eats away at the share of savings on gross domestic product, hence having an unfavorable effect on external balance. Since countries experiencing a high growth rate of real income per capita usually tap into foreign savings, their current account balances reflect the financing of this economic growth. Or, countries with quite a high level of real income per capita are expected to be creditor nations earning a net international investment income on their foreign assets which makes a positive contribution to their current account balances. A worsening terms of trade means real depreciation since it is associated with a loss of foreign exchange earnings. Similarly an increase in international interest rates leads to capital outflows under the deregulated capital account regime so it puts an upward pressure on real exchange rate towards depreciation. And lastly, productivity growth usually makes tradables relatively cheaper and thus causes a real appreciation in local currencies.

Our focus in this work is placed on the effect of real exchange rate on the competitiveness of national manufacturing industries so we want to construct a measure of relative price level in a way it enables to make an international comparison of local prices. For this reason, we adopt the purchasing power party based approach into determining the equilibrium level of real exchange rates. Here, the real exchange rate misalignment would no longer be an indicator of external imbalances or a permanent deviation of current account balance from its benchmark value based on underlying economic fundamentals. Instead, a real exchange rate distortion would depend on how local prices are detached from world prices.

According to purchasing power parity based approach, a misalignment basically shows whether the economy has outward orientation as revealed by its competitive exchange rate in real terms which fosters tradable sector, or it has inward orientation shown by the overvalued currency which essentially promotes nontradables sector (Dollar, 1992). In other words, a real exchange rate misalignment can be treated as the degree to which the real exchange rate is distorted away from its free trade level. Real undervaluation or overvaluation is just a measure of how incentives are organized in a way that is suitable for domestic or global markets.

Relative price level for a country is equal to 100 times the product of the exchange rate in terms of dollars per unit of local currency and consumer price index for that country divided by that of the United States. Hence, the United States is used as a benchmark country. In the absence of nontradable goods in the consumer price index basket and any trade barrier between countries, relative price level would be 100 for all countries because here all goods are deemed tradable and the law of one price holds for tradables under open economy conditions. For example, if relative price level is greater than 100, then we can conclude that domestic price level would be higher than international price level as a result of trade policy and that the local industry would be able to sell its goods dear relative to international prices behind the protective wall of high tariffs which is a sign of inward orientation, and therefore local currency would be regarded as overvalued. With no nontradable goods in the basket, relative price level would reveal the level of protection provided to local producers.

However, this is not the case. There are in reality nontradable goods in the consumer price index basket. Although the country is open to free trade, the relative price level will not be equal to 100 due to the existence of nontradable goods in the basket, which are not subject to the law of one price. More specifically, the price of nontradable goods is contingent upon relative factor endowments whose factor prices do not necessarily undergo equalization process across countries. Depending on the relative factor endowment and factor prices, the price of nontradable goods differ across countries. The representative consumer basket includes nontradable goods whose prices are country specific. Therefore, we cannot justifiably conclude that any deviation of relative price level from 100 for a country would indicate a real exchange rate distortion because relative prices under free trade would not be equal to 100. For example, assume that relative price level for a country is greater than 100 and thus it is categorized as inward-oriented. But, in fact, this country may be outward oriented so that it tries to keep its price of tradable goods low in global terms but the relatively high level of nontradable good prices would make it seem as if it were an inward-oriented country. The reasoning goes as follows: as per capita income goes up, labor as a factor of production gets scarcer and nontradable goods that are mostly labor-intensive become more expensive, thereby raising the consumer price index and appreciating the real exchange rate. A high level of consumer prices is thus related to real appreciation. But it is still possible that tradable goods are internationally competitive and the existence of expensive nontradable goods in the basket makes the real exchange rate seem as overvalued. Or quite to the contrary. Poor countries are generally labor abundant and the price of nontradable goods are cheap relative to those in advanced countries. Relative price level for a poor country may turn out to be lower than 100 due to the existence of cheap nontradable goods in the basket. Nevertheless, this developing country may want to insulate its infant industry from foreign competition and could pursue protective policies accordingly. Hence, tradables prices could be high in that country in global terms. However, high international prices in tradable good might be more than offset by cheap nontradable goods and the relative price level for this country might be below 100. Then it would be wrong to label this poor country as an outward oriented one.

As a result, the standard measure of relative price level for a country with which to judge if a local currency is over-or under-valued becomes biased and requires correction for the variation in the indices due to the differences in factor endowments. Therefore, the relative price level needs to be adjusted for what is called as Balassa-Samuelson effect which is nothing but the downward bias in real exchange rate created by the higher income level. At this point, gross domestic product per capita comes to the rescue since relative factor endowments can be best proxied by per capita national income. According to the income method, gross domestic product just represents the total sum of factor incomes accruing to the factors of production in a given time period. In this way, we are able to get rid of the bias created by the differences in labor productivity across countries. The residuals obtained from the regression of relative price level on per capita gross domestic product measure the degree to which local prices are high or low by international standards after allowing for overall labor productivity differences. Therefore, the real overvaluation or undervaluation is captured by the residuals. If the sign of residuals is positive, then the local currency is overvalued in real terms, and if negative, it is undervalued likewise. In other words, when the actual relative price level is greater than its fitted value, then domestic price level is above the free trade level and the local currency is overvalued in this sense.

The methodology of constructing an overvaluation index can be outlined as follows (Johnson et al., 2007): The price level of a country is regressed on per capita income at purchasing power parity dollars. All the variables are specified in logarithmic scale. The residuals obtained from the regression are taken as a measure of overvaluation adjusted for Balassa-Samuelson effect since the fitted values represent the equilibrium real exchange rate. Johnson, et.al. run a cross section regression for every year in their sample but Rodrik (2008) constructs his index by running a single panel estimation with fixed time effects. It becomes clear that the point of measuring the equilibrium level of real exchange rate is to quantify the deviation of the nominal exchange rate from purchasing power parity after differences in economic development levels are allowed for (Prasad et al., 2007).

It is extremely important to point out that in this setting, the real equilibrium exchange rate is the one that would make real wages consistent with its productivity level. Any increase in real wages which is not supported by an increase in labor productivity creates a tendency towards real overvaluation, that is, prices get relatively high in international terms. If real wages increase pari passu with labor productivity, then prices would remain unchanged in the world market (Gala, 2008). Levy-Yeyati and Sturzenegger (2007) also state that real exchange rate depreciation is associated with lower real wages and that real depreciations stimulate economic growth through the investment channel. And real appreciation do exactly the opposite. This might be the reason why governments are haunted by what they refer to as “fear of appreciation”.

5.2 Model

We want to analyze the determinants of manufacturing value added share in developing economies by making use of panel data econometrics. First, we construct our overvaluation index adjusted for the Balassa-Samuelson effect as outlined in section 5.1. Then, we empirically establish that capital flows are associated with local overvaluations. Then we present baseline regression results along with a series of robustness checks.

5.2.1 Construction of the overvaluation index

The usage of the consumer price index based real effective exchange rate to control for the effects of the appreciation of local currency on the manufacturing industry can be very problematic in that it does not account for the Balassa-Samuelson effect, which might create a bias in the estimation step.

The Balassa-Samuelson effect can be put as follows: As real gross domestic product per capita increases, then the real exchange rate which is defined as the relative price of tradables in terms of nontradables tends to decline because labor productivity in manufacturing industry increases more compared to nontradables. As a result, relative prices change in favor of nontradables as a country makes a progress in the path of economic development, a trend which puts a downward pressure on its real exchange rate, causing the local currency to become more valued internationally. In sum, a rise in per capita income leads to overvaluation, ceteris paribus.

Hence the need arises for factoring in the Balassa-Samuelson effect. The relative price of tradables is generally high in developing countries, a fact which needs to be adjusted for in a study examining the role the relative price of tradables played in the premature deindustrialization phenomena.

We created a time-varying index of real overvaluation adjusted for the Balassa-Samuelson effect as suggested by Prasad et al. (2007). But we made a twist to the original derivation of the index along the lines of Rodrik (2008). To obtain a measure of real overvaluation, we regress national price level which is given by the ratio of purchasing power parity conversion factor to nominal exchange rate on real GDP per capita with fixed time effect one way error component model. The original index constructed by Prasad et al. (2007) has been based on the relative price level of a country with respect to that of the United States. Here, the real exchange rate data have been constructed from the Penn World tables, version 9.1 by taking the ratio of price level of output-side real GDP at current PPP (pl-gdpo, base year=2011) which measures the ratio of purchasing power parity conversion factor to nominal exchange rate, that is PPP/XRAT where PPP stands for purchasing power parity conversion factor and XRAT for nominal exchange rate. Purchasing power parity conversion factor is a quantitative measure of how many units of local currency are needed to purchase the same amount of goods and services as one US dollar could purchase in the United States. Nominal exchange rate specifies the ratio at which local currency can be exchanged for one US dollar. PPP/XRAT thus yields the level of national prices. Hence the division of purchasing power parity conversion factor by nominal exchange rate enables us to make a direct comparison of the cost of the goods that make up gross domestic product across countries. PPP-XRAT ratio shows how many dollars it costs to locally produce what could have been produced at one US dollar in the United States. To smooth out the short-run fluctuations in the real exchange rate, we take 5-year simple averages for all the variables in the model. If the PPP factor divided by nominal exchange rate is greater than one, then the value of the local currency is more appreciated than is indicated by purchasing power parity, that is, it is overvalued. The data for the real GDP per capita have been taken from the same source as that of the real exchange rate data for compatibility. We have taken the natural logarithm of both variables to run the model.

$$ln\ RPL_{it} = \alpha + \beta\ ln\ RGDPCH_{it} + \Sigma_T \lambda_T PER_T + \varepsilon_{it} \tag{5.1}$$

Table 5. 1 : The Balassa-Samuelson Effect.

dependent variable: ln relative price level			
		Coefficient	t-statistics
independent variable	ln per capita income	0.121	7.45***
	Constant	-3.299	-24.53***
no. of observations: 636			

The regression above includes only time fixed effects. Asterisks indicate that robust t-statistics are significant at the *10%, **5%, and ***1% level. We found evidence for the Balassa-Samuelson effect as can be seen from the regression output above (Table 5.1). The baseline regression results indicate that β-estimate is 0,121 and highly statistically significant. As real income per capita increases by 10%, then the real exchange rate appreciates by 1,21 % as expected. Now, we are able to construct the real overvaluation index which takes the Balassa-Samuelson effect into consideration by taking the residuals of the regression above. We look upon the fitted values of the relative price level from the regression above as an equilibrium real exchange rate. Therefore the residuals obtained from the regression have the merit of quantifying the degree of overvaluation. In other words, if we subtract each fitted value of the real exchange rate in natural logarithm from its observed values, we get the overvaluation index. We can show it mathematically:

$$\ln overval_{\mathrm{it}} = \ln RPL_{\mathrm{it}} - \ln \widehat{\mathrm{RPL}}_{it} \qquad (5.2)$$

An overvaluation score of greater than 1 means that goods produced at home are relatively dear in international dollar terms, indicating that the local currency is overvalued.

The real overvaluation index thus constructed has its advantages. First of all, the Balassa-Samuelson effect has been allowed for the real exchange data. Secondly, the index is comparable over time as well as across countries. The fixed time effect model estimation enables us to make comparisons over time. And last but not least, the index is related to the international price differentials so here the overvaluation of a currency has nothing to do with the external balance of the country under consideration.

5.2.2 Capital flows and overvaluation

In line with the literature on the relationship between capital inflows and local currency overvaluation (Prasad et al., 2007; Erten et al., 2021, among others), we want to empirically show that capital flows as captured by the net financial flows as a share of GDP (Ghosh and Qureshi 2016) actually lead to an increase in overvaluation index adjusted for the Balassa-Samuelson bias.

Table 5. 2 : The impact of capital inflows on overvaluation index: Fixed effects model estimation.

Dependent variable: lnoverval	Coeff	t-stat
constant	-0.09	-2.03**
NFFGDP	-0.19	-1.86**
Number of observations	1543	
Country fixed effects	Yes	
Time dummies	Yes	

According to the two-way error component model which controls for the full set of country and time fixed effects, a surge in capital flows by one standard deviation is associated with an overvaluation of 1.67 percent since an increase in financial liabilities enters the balance of payments with a negative sign (Table 5.2).

To address the possible endogeneity between capital flows and real exchange rate, we run two-variate first-order panel vector autoregressive model since the feedback effects from overvaluation to net financial inflows might introduce a bias into the fixed effect estimation. In the spirit of VAR model tradition, we treat both net financial flows and overvaluation index as endogenous while controlling for exogenous factors of per capita income dynamics. We estimate our panel VAR model by the Arellano-Bond panel GMM estimator (Table 5.3). The endogenous regressors in the first difference equation are instrumented with the predetermined values of dependent variables in levels from the second through the tenth lag and Hansen test of overidentifying restriction result suggests that sample moment conditions are satisfied and the instruments used are valid.

Table 5. 3 : Panel VAR GMM estimations.

		Coeff	z-stat
NFFGDP			
	NFFGDP(t-1)	0.28	3.03***
	lnoverval(t-1)	-0.02	-1.98**
	Lnrgdpch	0.007	1.49*
lnoverval			
	NFFGDP(t-1)	0.142	2.28**
	lnoverval(t-1)	0.93	43.06***
	Lnrgdpch	-0.03	-3.37***
Number of observations		1461	
Number of panels		39	
Hansen's J chi-square		31.2	(p-value= 0.47)

Since the reduced-form estimates do not lend themselves to economic interpretation due to the atheoretical nature of VAR models, we instead turn the first-order panel VAR model into an infinite order vector moving average process. For this transformation, we guarantee the stability of the system as required by the eigenvalues of the companion matrix being inside the unit circle (Figure 5.1). Since the correlation among the shocks is built into the system, we carry out the Granger causality test as an identification strategy for obtaining the orthogonalized impulse-response functions.

Table 5. 4 : Panel VAR Granger causality.

Equation/Excluded	Chi2
NFFGDP	
Inoverval	3.915** (p-value=0.048)
Inoverval	
NFFGDP	5.179**(p-value=0.023)

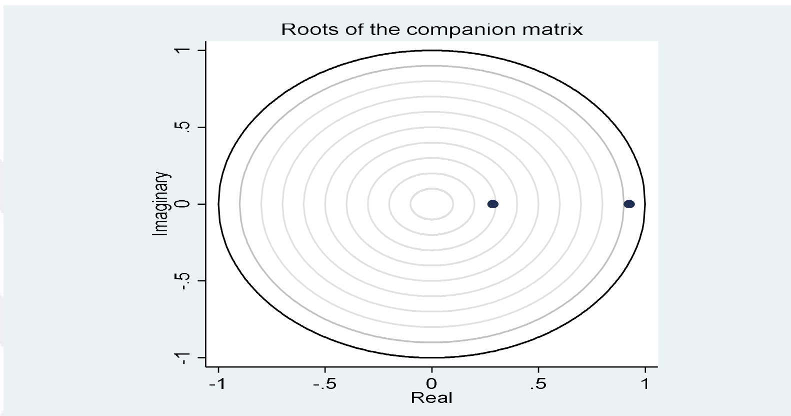

Figure 5. 1: Eigenvalue stability condition.

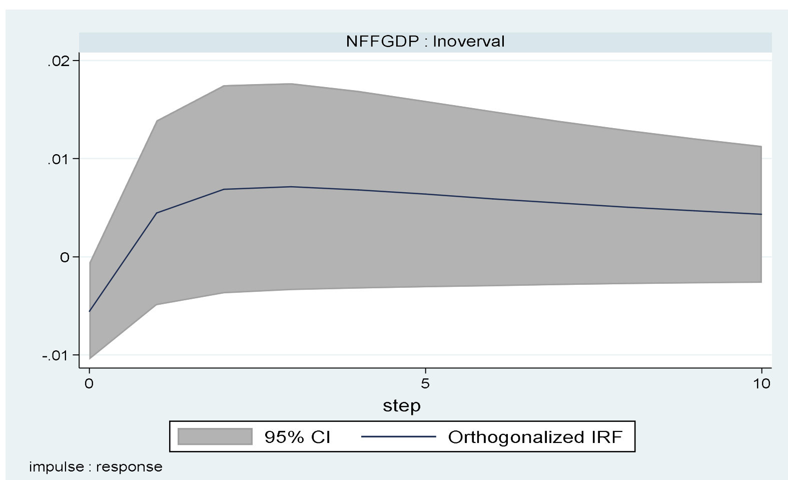

Figure 5. 2: Response of overvaluation index to capital flow shocks.

While the direction of causation from capital flows to overvaluation is stronger as evidenced by their associated probability values, we could establish that both capital flows and overvaluation index mutually Granger-cause each other at 5 percent significance level (Table 5.4). When we isolate the effect of positive capital inflow shock of one standard deviation by the Cholesky decomposition, we find that it is statistically significantly associated with an immediate overvaluation in real terms according to the 95 percent confidence interval estimated by the Gaussian approximation based on 400 Monte Carlo draws from the fitted reduced-form model (Figure 5.2).

5.2.3 Data and estimation

The sample countries have been chosen on a regional basis such as Latin America, Sub-Saharan Africa, East Asia, North America and Europe, and the data set covers 39 developing countries (Table 5.5). Since the developing countries covered in our dataset show great differences in terms of geographical location, demographic structure, and participation into the global value chains, the country fixed effects are added to take their distinctive characteristics into account. Also, the heterogeneity in their economic development level has been allowed for by augmenting the model with the per capita income level and its quadratic term being added as regressors. To investigate more clearly the effects of the structural transformation brought by the globalization, the data are selected to span years from 1960 through 2017. The data on the share of manufacturing industry in nominal GDP, and GDP per capita in current dollars have been obtained from World Bank national accounts data, and OECD National Accounts data files. As explained above, we have constructed our overvaluation index using Penn World Table, 9.1.

Now we can go back to the main regression analysis of this study. Our model specification owes a lot to Rodrik's seminal paper.

$$manshare_{it} = \beta_{0i} + \beta_{1i}\, lny_{it} + \beta_{2i}\,(lny_{it})^2 + \beta_{3i} ln\; overval_{it} + u_{it} \quad (5.3)$$

$$u_{it} = \mu_i + \theta_i f_t + \varepsilon_{it} \quad (5.4)$$

The model includes real income per capita at PPP variable ($\ln y_{it}$) along with its quadratic term ($\ln y_{it}^2$) to keep track of the inverse U-shape relationship between national income and manufacturing share ($manshare_{it}$). To control for the time-invariant country-specific factors which cannot be observed and the effect of globalization on dependent variable, our model will be specified as two-way error component model (Baltagi, 2008). Time-invariant heterogeneity across countries are controlled for by country fixed effects denoted by μ_i. To see if the deindustrialization process gets faster in recent decades for emerging countries, we have added period dummy such that the shocks occurred in the time period starting with the new century affect each country in different ways and are denoted by $\Theta_i f_t$ where Θ_i stands for heterogeneous factor loadings and f_t for the unobserved common factor. The time dummy capturing the cross-section dependency or time effects is specified to cover the post-2000 years during which the pace of globalization has greatly accelerated. So its coefficient can justifiably be interpreted as the effect of globalization on the industrialization in developing countries.

The overvaluation index (ln$overval_{it}$) in (5.2) also appears on the right-hand side of the model.

Table 5. 5 : The descriptive statistics of the data.

Variables	Mean	Standard Deviation
ln RPL	-1.35	0.62
ln RGDPCH	8.14	0.92
manshare	14.42	7.02
empshare	11.27	6.19
rmva	15.43	6.43
nmva	16.76	6.82
NFFGDP	-0.021	0.087
ln per capita income, at $PPP	10.79	1.97
ln per capita income, at current $	6.83	1.35
ln per capita income, at chained PPPs 2017$	8.64	1.13
ln pop	3.28	1.47
ln overval	0.00	0.306
ln RER_pwt	-1.35	0.62
ln RER_{CPI}	3.84	2.78

All the variables are five-year averages. *ln RPL*: natural logarithm of the price level of output-side real Gross Domestic Product (GDP) at current Purchasing Power Parity (PPP) dollars, *ln RGDPCH*: nat. log. of real GDP per capita at current PPP dollars; *manshare*: manufacturing sector, value added as percentage of GDP; *emphare*; employment share of manufacturing industry, *rmva*; value added share of manufacturing at constant 2015 prices, *nmva*; value added share of manufacturing at current basic prices, *NFFGDP*; net financial flows as percentage of GDP, *ln per capita income, at $PPP*: nat. log. of GDP per capita at current international PPP dollars; *ln per capita income, at current $*: nat. log. of GDP per capita at current US dollars; *ln per capita income, at chained PPPs 2017$*; the nat. log. of expenditure side real GDP per capita at chained PPPs 2017 US dollars, *ln pop*; the nat. log. of population, *ln overval*: nat. log. of overvaluation index adjusted for the Balassa Samuelson (BS) effect; *ln RER_pwt*: nat. log. of overvaluation index unadjusted for the BS effect; *ln* RER_{CPI} : natural logarithm of real exchange rate based on the consumer price index. To balance the panel from 1960 up to 2017, we used STATA's *ipolate* command (along with its *epolate* option) for missing years (Rodrik, et.al. 2014).

To allow for cross section dependency as well as heterogeneity in parameters we adopted the Augmented Mean Group estimator introduced by Eberhardt and Teal (Bond and Eberhardt 2009; Eberhardt and Teal 2010). Most of the panel data estimators are based on the assumption of parameter homogeneity across panel members which is more appropriate for micro datasets. In macro panels where cross section dimension involve countries, states, and regions, the assumption of same slope coefficients becomes untenable. AMG estimation introduces the heterogeneity in slopes into the model. It deals with the unobservable time shocks with heterogeneous impacts across panel individuals as well as cross section dependency.

As can be noticed from (3), we allow the coefficients on each explanatory variable to vary across countries so the slope heterogeneity is built into the regression model. Pesaran and Yamagata (2008) proposes the slope homogeneity tests. All test statistics find strong evidence against the null hypothesis of slope homogeneity (Table 5.6).

Table 5. 6 : Slope Homogeneity Test.

Slope homogeneity test		
	test stat	p-value
Δ	3.333***	0.001
Δ_{adj}	4.713***	0.000

In the first step of estimation procedure, the pooled regression model is augmented with time dummies (D_t) and the estimated coefficients on the time dummies are obtained by applying the first-difference ordinary least square estimation.

$$\Delta manshare_{it} = \delta_1 \Delta lny_{it} + \delta_2 \Delta (lny_{it})^2 + \delta_3 \Delta ln\ overval_{it} + \Sigma_{t=2}^{T} f_t \Delta D_t + e_{it} \quad (5.5)$$

In the next step, the unobserved common factor is replaced by the estimated coefficients on the time dummies, $\widehat{f_t}$.

$$manshare = \beta_{0i} + \beta_{1i}\, lny_{it} + \beta_{2i}\, (lny_{it})^2 + \beta_{3i} ln\ overval_{it} + u_{it} \quad (5.6)$$

$$u_{it} = \mu_i + \theta_i \hat{f_t} + \varepsilon_{it} \quad (5.7)$$

To show that the estimation methodology does not affect the sign and significance of the overvaluation index coefficient, we find it appropriate to present the results from new estimators allowing for the cross-section dependency as well as the FE estimator (Table 5.7).

Table 5. 7 : The Baseline Regression Results.

Dependent variable: Manufacturing share in GDP				
	AMG		Fixed Effect	
Independent variable	Coefficient	z-statistics	Coefficient	t-statistics
ln per capita income, at $PPP	2.25	2.87***	-0.358	-0.37
ln per capita income sq, at $PPP	-0.10	-2.91***	0.012	0.28
ln overval	-2.57	-2.14**	-4.39	-4.85***
2000s+	-1.13	-1.63*	-1.79	-2.86***
Constant	1.32	0.3	17.37	3.35***

We note that within the framework of the estimated model, the effects of overvaluation stems from the changes within countries, not from the differences in levels across countries.

ln per capita income has positive coefficient but its quadratic term takes on a minus sign and both are statistically significant: As expected, we found an-inverse U-shape relationship between share of manufacturing industry in nominal GDP and GDP per capita at PPP prices.

The overvaluation index has an estimated coefficient of -2.57 which is highly statistically significant. When local currency is overvalued by 50% which is approximately one and half standard deviations as a result of a surge in capital inflows, the manufacturing share goes down by 1.25% over the 5-year period. This effect, which is quite large by any standard, is consistent with our initial expectations. Since a rise in the overvaluation index means appreciation of the local currency in international terms, an appreciation in the real exchange rate adjusted for the Balassa-Samuelson effect makes home manufacturing industry in developing countries less competitive internationally and leads to its contraction, suggesting a capital inflows-induced Dutch disease.

With the turn of new century, the developing countries experienced a massive deindustrialization; the time dummy for the two thousands is -1.24 and statistically significant, indicating a sharp decline of 1.24% in the share of manufacturing in nominal GDP.

After estimating the model by the fixed effect (within) estimator, we implemented Pesaran's test (2004) for cross-sectional dependency in short panels since we have rearranged the whole dataset in 5-year averages. The null hypothesis stating the absence of contemporaneous correlations across cross-sectional units is strongly rejected, indicating that we are right in using the AMG methodology (Table 5.8).

Table 5. 8 : The test for cross-section dependency.

	Pesaran's test of cross sectional independence
CD-test	9.104***

After detecting a contemporaneous correlation among the idiosyncratic error terms, we check out that our data do not have unit root process. Since we cannot ignore cross-section dependency, the panel unit root tests of first generation ceases to be reliable anymore because they are shown to suffer from over-rejection bias.

In other terms, even though the data contains unit root process, the first generation tests of unit root may mislead us into rejecting the non-stationary hypothesis. With this point in mind, we carried out the Pesaran's CIPS test (2007) for unit root processes assuming cross section dependency. Since STATA could run both first and second generation tests together, we obtained the results of both panel unit root tests (Table 5.9).

According to the test results, the share of manufacturing industry in nominal GDP, the per capita real income, its quadratic term and the natural logarithm of the overvaluation index do not contain unit root processes.

Table 5. 9 : The second generation panel unit root test.

Pesaran's CADF unit root test									
Series	lag	trend	constant	t-bar	cv-10	cv-5	cv-1	Z[t-bar]	P-value
Manshare	2	no	yes	-2.915	-2.03	-2.11	-2.26	-6.847	0.000
per capita income	1	no	yes	-2.933	-2.03	-2.11	-2.26	-6.951	0.000
OVERVAL	1	yes	yes	-2.681	-2.55	-2.64	-2.8	-2.37	0.009

5.2.4 Robustness checks

First, we will run the model by splitting the data along the overvaluation-undervaluation periods to see what happens to the relationship we want to establish between the real exchange rate misalignments and the manufacturing share in the national income. Then, we run our baseline model with different measurements of deindustrialization and different dataset. Third, we employ different measures of real exchange rate to show that our results are quite robust to different methodologies and data sets. In this regard, we will include the raw real exchange rate index we have calculated from the Penn World Tables, 9.1 in the regression model since in the baseline regression model we decided to purge the real exchange rate index of the Balassa-Samuelson effect. We tapped into the IMF's International Financial Statistics database and construct a measurement of real exchange rate based on the consumer price index. Fourth, we apply 2-step panel Generalized Method of Moments (GMM) estimation to address concerns about the endogeneity of real exchange rate misalignments within the model and show that the results are robust to different specifications. Fıfth, we want to control for the role of inequality shocks, supply chain disruptions, and institutional innovations on the path of industrialization for developing countries.

5.2.4.1 Nonlinearity

Now we would like to consider the case that the relationship between real exchange misalignments and the manufacturing share in output may be nonlinear. We suspect whether the manufacturing competencies which have been eroded by local currency overvaluations in real terms cannot simply be brought back during the undervaluation periods. Therefore, we split the whole dataset into times of overvaluation and undervaluation and re-estimate the model by the fixed effect estimator.

Table 5. 10 : The regression results for the overvaluation vs undervaluation periods.

Dependent variable: Manufacturing share in GDP				
	Overvaluation periods		Undervaluation periods	
Independent variable	Coefficient	t-statistics	Coefficient	t-statistics
ln per capita income, at $PPP	1.01	1.35*	-0.95	-0.81
ln per capita income sq, at $PPP	-0.05	-1.51*	0.042	0.78
ln overval	-3.65	-2.21**	-1.58	-0.87
2000s+	-2.41	-2.67***	-1.33	-1.6*
Constant	10.51	3.66***	20.8	3.27***
Number of observations	236		232	

It is striking that the negative relationship between the overvaluation index and manufacturing share is quite strong and statistically significant in times of overvaluation but the coefficient before the real exchange index declines by half and ceases to be significant during the undervaluation periods (Table 5.10). Hence, this result provides evidence that there may only be one-way effect of real exchange misalignments on premature deindustrialization, that is, while overvaluations hurt domestic manufacturing capabilities, undervaluations may not help revive them.

This might be because the local currency overvaluations allow domestic manufacturers to import intermediate goods with better quality at a cheaper cost compared to their local substitutes. Then being unable to compete with better quality imports cheapened by real overvaluation, local industries providing semifinished inputs to final producers may be forced to be driven out of business, resulting in such a dramatic loss of domestic manufacturing competencies that even an ensuing undervaluation period could not resuscitate them thereafter. The policy implication of this finding is clear. The manufacturing output share lost to overvaluation may not be recovered by simply pursuing polices aimed at keeping local currencies undervalued to gain competitiveness.

5.2.4.2 Different measurements of deindustrialization

Though Tregenna (2009) defines deindustrialization in terms of both employment and production shares, the literature has conventionally focused on the declining share of manufacturing in total employment since, among other reasons, the deindustrialization process is more pronounced in employment shares than in value added share (Felipe et al., 2019). We, however, prefer to use domestic value added shares as a principal measure of deindustrialization because it carries more information regarding the nature of deindustrialization process and usually harder to detect it than employment shares. First, since the value added consists of gross profits and total compensation, it directly refers to net factor income generated in the sector and its evolution also allows us to trace out the collective contribution of total factor productivity improvements and changes in factor employment to the sector output (Kummritz et al., 2016). Second, declining share of manufacturing employment could be attributed to greater use of economies of scale and capital accumulation in accordance with Kaldor’s stylized facts so it could merely reflect capital deepening process where the opposite direction of employment and output shares between high and low capital intensity sectors becomes a distinctive feature on the nonbalanced growth path (Acemoglu and Guerri, 2008). As a corollary, lower output shares generally imply employment deindustrialization, but not vice versa (Peneder and Streicher, 2018). Since our primary concern is the link between local currency overvaluation and premature deindustrialization, value added shares at current prices show more directly the profit-squeezing effects of declining relative tradable prices as captured by international price tendencies. Though our main findings are based on manufacturing output share at current prices, we also run our model with other measurements of deindustrialization such as employment and real value added shares in addition to nominal shares. For this end, we make use of Groningen Development Center, Economic Transformation Database (de Vries et al., 2021) and Penn World Table 10 (Feenstra et al., 2015). The dataset covers 51 countries from 1990 through 2018.

Model (1) is estimated by the common correlated effects estimator with a full set of cross-section averaged regressors while augmented mean group estimator is applied to obtain model (2) and (3) coefficients. For dynamic specification in (4), (5) and (6), the 2-step system GMM estimation procedure is carried out since the autoregressive coefficient is in the vicinity of 1 but not significantly different from 1 with 95% confidence level. Both lagged manufacturing share and lnoverval are treated as endogenous while the exogeneity of lnrgdpch, lnrgdpchsq, lnpop, lnpopsq and the time dummy representing the 2000's is assumed. We apply small sample correction to get t-statistics. We also implement Windmeijer's finite-sample correction for the two-step standard errors since the GMM is an asymptotic estimator and may yield downwardly-biased standard errors in small samples.

Table 5. 11 : Regression results for different measurements of deindustrialization.

	2nd generation panel data estimation						Dynamic panel estimation					
	(1) Empshare		(2) Rmva		(3) Nmva		(4) Empshare		(5) Rmva		(6) Nmva	
	Coeff.	z-stat	Coeff.	z-stat	Coeff.	z-stat	Coe.	t-stat	Coe.	t-stat	Coe.	t-stat
Empshare-1							1.01	58.8***				
Rmva-1									1.04	31.7***		
Nmva-1											0.99	45.6***
lnrgdpch	80.91	3.1***	-14.02	-0.27	17.99	0.42	-1.1	-1.69*	-3.16	-1.49	-3.64	-1.62
lnrgdpchsq	-4.79	-3.04***	-0.09	-0.04	-1.21	-0.49	0.05	1.46	0.17	1.44	0.2	1.61
lnpop	-1774.2	-1.8**			-1608.6	-1.08	0.12	0.97	0.07	0.46	-0.04	-0.39
Inpopsq	181.48	2.22**			194.12	1.22	-0.02	-1.32*	-0.01	-0.69	0.01	0.58
lnoverval	-0.83	-1.72**	-0.98	-1.8**	-1.27	-2.48***	-1.21	-5.52***	-1.22	-3.7***	-1.05	-1.9**
globalism	-0.05	-0.51	-1.0	3.34***	-2.88	-4.31***	0.19	2.46**	0.05	0.6	0.07	0.67
constant	4656.8	1.43	153.5	0.6	3494.8	0.99	5.09	1.84*	13.4	1.46	15.8	1.63
Number of instruments							53		53		53	
Number of observations	1479		1479		1479		1428		1428		1428	
Number of countries	51		51		51		51		51		51	
Hansen test of overidentifying restrictions							46.65	0.405 (p-value)	47.1	0.38 (p-value)	45.8	0.44 (p-value)
Arellano-Bond test for AR(1)								-4.3***		-4.5***		-4.52***
Arellano-Bond test for AR(2)								0.61		-1.42		-0.46

The regression results in the first three models are quite telling in that we could invariably establish a relationship between overvaluation and deindustrialization though the harmful impact of globalization is significant only for real and nominal manufacturing value added shares (Table 5.11). Except Model (1), we lose the nonlinear relationship between per capita income and manufacturing share of total employment and real/nominal value added once we measure the former at constant (chained) PPP dollars. This peculiar finding might attest to the fact that real income dynamics have more explanatory power for employment deindustrialization. Models (4), (5), and (6) also show that our findings about the adverse effects of overvaluation are robust to dynamic model specification as well. More strikingly, though run from completely different datasets and different measurements of deindustrialization and overvaluation indices, 2-step GMM results about overvaluation index coefficients at table 5.15 and 5.16 below are numerically close to each other, indicating a highly robust finding about the cause of premature deindustrialization. However, we could not provide any evidence concerning the malign effects of trade globalization on different measurements of deindustrialization in dynamic panel setting. In marked contrast to our findings in the rest of our work the effect of globalization seems significantly positive for employment share of manufacturing industry within dynamic specification, it is quantitatively negligible being less than 0.2 percentage points.

5.2.4.3 Methodology and different dataset

One might also raise an objection to the validity of our results since they largely depend on the specific methodology we adopted for measuring the real exchange misalignments. We construct our overvaluation index by purging the real exchange rate based on the purchasing power parity conversion factors of the Balassa-Samuelson effect so that we can allow for the tendencies appreciating the local currencies associated with the economic development level. However, a common shock such as a rise in productivity may both affect the level of income per capita and the relative price level, introducing a downward bias in the estimates of the overvaluation index. Therefore, the negative relationship between the real exchange rate index adjusted for the Balassa-Samuelson effect and the manufacturing share might be attributed to another factor like productivity enhancements.

For this end, we run the baseline model with the unadjusted real exchange rate index, *lnRER_pwt*, the natural logarithm of the PPP-XRAT ratio in the PWT 9.1.

Table 5. 12 : The baseline regression results with the raw real exchange rate index.

Dependent variable: Manufacturing share in GDP				
	AMG		Fixed Effect	
Independent variable	Coefficient	z-statistics	Coefficient	t-statistics
ln per capita income, at $PPP	0.51	0.62		
ln per capita income sq, at $PPP	-0.024	-0.65		
ln per capita income, at current $			6.69	2.5***
ln per capita income sq, at current $			-0.364	-2.08*
ln RER_pwt	-1.45	-2.92***	-2.058	-1.64**
2000s+	1.32	2.15**	-2.32	-3.48***
Constant	7.14	1.53	-15.6	-1.27

Even with the real exchange rate index unadjusted for the Balassa-Samuelson effect, we can establish a relationship between overvaluation and premature deindustrialization (Table 5.12). Even though the size of the coefficient before the raw index has considerably been shrunk due to the Balassa-Samuelson bias it still remains to be in the negative territory and statistically significant, thereby constituting a lower limit for the detrimental effects of local currency overvaluation on deindustrialization. A minor technical caveat needs to be stated here. We had to include the income per capita measured at current US dollars in the fixed effect estimation because we lost the quadratic relationship well documented in the literature between income level and industrialization once we run the model with the income per capita measured at the purchasing power parity dollars.

Another objection might be related to the measurement errors. To remove the possible concerns over the reliability of real exchange rate measurements in the PWT, we construct an alternative index based on the IMF's IFS database. The index simply measures the level of nominal exchange rate between home currency and the US dollars multiplied by the ratio of producer price index for the United States to the consumer price index in the home country.

$$\ln RER_{CPI} = \ln \left(\frac{E \; x \; PPI_{US}}{CPI}\right) \tag{8}$$

Where E represents the home currency units per the US \$, PPI_{US} stands for the producer price index for the US, and CPI denotes consumer price index in the home country. It is important to note that with this measurement, a rise in real exchange rate denotes undervaluation of the home currency. In other words, when the home currency rate undergoes a depreciation more than is necessitated by the inflation differential, the real exchange rate goes up, indicating a real undervaluation. Hence, our initial expectation is a positive (not negative) coefficient before the real exchange rate variable in the model since a decline in our index is supposed to gnaw at the manufacturing share in national output.

We should note that since we could not run the Augmented Mean Group estimator because panels become too small with five countries from the original dataset being dropped, we instead apply the Common Correlated Effects Mean Group estimator developed by (Pesaran 2006) to estimate the model in the presence of cross-section dependency, slope heterogeneity, and heterogeneous time effects. Instead of running first-difference OLS for the augmented model with a full set of time dummies, the CCEMG estimator simply augments the model with the cross-section averages of both dependent and independent variables as additional covariates to account for the unobserved common factor, f_t in (4) and then moves on to estimating the model using the mean group estimation methodology.

Table 5. 13 : The Baseline Regression Results with the real exchange rate index based on CPI.

Dependent variable: Manufacturing share in GDP				
	CCEMG		Fixed Effect	
Independent variable	Coefficient	z-statistics	Coefficient	t-statistics
ln per capita income, at \$PPP	2.039	1.55*	-0.333	-0.30
ln per capita income sq, at \$PPP	-.096	-1.61*	0.0105	0.21
$ln\ RER_{CPI}$	2.602	1.79**	0.252	2.17**
2000s+	0.839	0.69	-1.57	-1.98**
Constant	-5.63	-0.36	16.84	2.77***

Now again, we are able to link overvaluation to deindustrialization in value-added terms in developing countries with another real exchange rate measure constructed from different database (Table 5.13). The coefficient before the real exchange rate index is positive as expected and significantly different from zero, suggesting that a decline in real exchange rate meaning an overvaluation wreaks havoc on the manufacturing share in output. Moreover, its size is quite close to -2.57 which is the AMG estimate in the baseline regression model in Table 4, indicating the robustness of our estimates. The globalization seems to have positively contributed to the industrialization of developing countries in the CCEMG estimation contrary to our expectations. A comparison of results between CCEMG and FE estimations may hint that the effect of globalization may be captured by the real exchange rate in the former methodology. Hence, our empirical findings about the potential sources of premature deindustrialization turn out to be quite robust to different real exchange rate measurements constructed by different methodologies and datasets.

5.2.4.4 Causality

In the literature, some economists hold that the real exchange rate is endogenous variable since it presumably reflects the long-term equilibrium of real variables. But we disagree with this opinion because the real exchange rate is regarded by the governments of many developing countries as a policy tool which should be manipulated to foster economic growth. So we think that we are justified to treat the real exchange rate as an exogenous variable.

However, after further consideration is being given on this issue, it seems that even though the endogeneity problem lies with the real exchange rate, the bias would not reinforce the effect of the value of local currency on manufacturing industry the way we expect it to do. We have already accounted for the possible effect of productivity increases on real exchange rate when we constructed the overvaluation index which is based on the real equilibrium exchange rate adjusted for the Balassa-Samuelson effect. To be more clear, the endogeneity problem which the real exchange rate might create would involve a upward, not downward, effect bias on the estimated coefficient of the overvaluation index because many shocks one can think of are positively correlated with the share of manufacturing industry. If we give a few examples of them, we can cite a positive supply shock of technological improvements and a negative demand shock of worsening terms-of-trade. The enhancement of profitability associated with the technological breakthrough leads to the expansion of manufacturing industry, but, on the other hand, the technological progress results in a more efficient use of resources, that is, a rise in productivity. Therefore, relative price of manufactures declines due to a higher level of productivity made possible by the positive technology shock, resulting in an appreciation in local currency. In this case, the share of manufacturing industry and overvaluation index move in the same direction, a fact which has a deleterious effect on the negative relationship we want to establish between them.

The positive endogenetiy bias is the case with the negative demand shock such as a deterioration in terms-of-trade, too. A fall in the relative price of exports causes manufacturing industry to contract because it produces tradable goods under open economy conditions. On the other hand, a worsening in terms-of-trade reduces a country's foreign exchange revenues, and an FX outflow starts thereafter, causing the overvaluation index to go down, that is, a depreciation of local currency. Again we found a positive relationship between the share of manufacturing industry and the overvaluation index contrary to the one we would like to see.

So we have every right to assume that the endogeneity bias captured in the covariance between the manshare and overval is positive if it ever exists. So the evidence we found about the negative relationship between the two does not stem from the endogeneity bias. In other words, we can safely assert that there is negative relationship between the share of manufacturing industry and the real exchange rate not because of a possible endogeneity bias, but despite it.

Razmi, et.al. (2012) state that the mainstream economic models treat the real exchange rate as an endogenous variable determined by preferences, factor endowments, and productivity. Magud and Sosa (2010) also mention about the Washington consensus view that rules out the real exchange rate as a policy variable since it is endogenously conditioned by underlying economic fundamentals. The real exchange rate is basically a relative price totally beyond the control of policymakers at all. According to the Washington consensus view, any deviation from the long run equilibrium of real exchange rate, whether it be overvaluation or undervaluation, hurts economic growth alike. Similarly, the so-called Dutch disease phenomenon is not a disease after all since a real exchange appreciation measured by fundamentals based approach may only reflect stronger fundamentals.

Eichengreen (2008) also discusses the possible endogeneity bias created by the inclusion of real exchange rates into growth regressions. Endogeneity bias could occur three ways. One is the Balassa Samuelson effect that as per capita income rises, then real exchange rate appreciates accordingly so growth is positively related to overvaluation. Secondly, acceleration in productivity growth lessens the need for undervaluation policy. Hence, growth is again positively correlated with real appreciation. Thirdly, the success of undervaluation policies in pushing up the economic growth generates sort of loyalty. Here, growth is negatively related to overvaluation. But Rodrik's argument (2008) is more unambiguous when it comes to which way the simultaneity bias cuts. He examines the possible sources of endogeneity bias which might create difficulties in interpreting the direction of causation. He cites capital outflows or a worsening terms of trade as shocks which might cause the real exchange rate to depreciate. These shocks have also bad consequences for economic growth. An upward revision of expectations about economic growth, on the other hand, might accelerate capital inflows into a country, leading to a real appreciation. Hence Rodrik concludes that the covariance between shocks affecting the economic growth and real exchange rate is expected to be negative given the economic theory. Since Rodrik wants to measure the favorable impact of undervaluation on economic growth, he constructs an undervaluation index. This explains why the sign of the endogeneity bias is expected to be negative. But in our work we created a measure of overvaluation to see the pernicious effect of real appreciations on manufacturing industry so the correlation between the shocks affecting the manufacturing share of total value added and overvaluation index is theoretically expected to be positive as we have exhaustively explained above.

Now we are ready to go over the macroeconomic models where the real exchange rate plays a significant role in driving economic growth.

Eichengreen (2008) seems to be in complete agreement with the mainstream economics that real exchange rate can be taken as a relative price and as such, it is deemed not to be in direct control of authorities. He, on the other hand, concedes that real exchange rate can be manipulated to stimulate economic growth by certain fiscal and monetary policies in the short to medium term. The reasoning goes as follows: once a small country assumption is made, then the price of tradable goods can be normalized to 1 due to the law of one price, and then the real exchange rate becomes equal to P_N/e, where P_N and e denote the price of nontradables and nominal exchange rate, respectively. Under the floating exchange rate regime, nominal exchange rate is certainly more volatile than the price of nontradables. The setup is thus complete. The monetary shocks affecting "e" would result in a change in real exchange rate since the price of nontradables acts relatively slow in the short run. Assume that an expansionary monetary policy in the form of lower domestic interest rate relative to that of world is followed by capital outflows, leading to nominal depreciation. Since nontradable prices are sticky to a certain degree in the short term, nominal depreciation can be translated into real depreciation. But, with a passage of time, inflation will kick in response to changes in nominal rates, and the price of nontradables will adjust accordingly. Given that inflation will always keep pace with nominal exchange rate in the long run, such manipulatory policies of real exchange rate cannot be sustained for long. In this regard, fiscal policy induced changes in real exchange rate stay longer in general compared to monetary policy ones. The more lasting effect of fiscal policies lies in the fact that they usually are more intricately connected with economic fundamentals. To see why, let's assume that a contraction in government spending reduces the demand for both tradables and nontradables but only the price of nontradables falls consequently while the price of tradables remains the same due to the law of one price. Assuming an inertia on the part of nominal exchange rate in response to indirect fiscal policies, real exchange rate goes up, indicating a depreciation. Monetary policies affecting nominal exchange rates in the medium term, however, could be enough to mobilize such underlying fundamentals as disciplined workforce, high domestic saving rates, or the country's status as a destination for foreign direct investment flows. Eichengreen defends the manipulation of real exchange rate for the sake of economic growth in so far as it is used as a "facilitating" condition. Therefore, these policies should ideally be accompanied by, for example, wage restraining policies so as to avoid the inflationary wave spoiling the real benefits of a currency depreciation. Hence, undervaluation policies cannot substitute for structural reforms, but they can only be used as a facilitator for carrying out the latter. Another reason why these undervaluation policies cannot be maintained for too long is that they tend to create political conflicts reflected in the discourse of so-called currency wars.

Williamson (2003) goes even further to construct a simple macroeconomic model in which the exchange rate is a policy variable per se determining the equilibrium level of savings and investment. Investment function traces out the positive relationship between real depreciation and export prospects so that a more competitive currency stimulates more exports and raises investment motives. On the other hand, real depreciation encourages net exports. Since the total savings are comprised the sum of domestic and foreign savings which is defined as the current account balance, any improvement in net exports reduces the availability of total savings to finance investments. Saving function captures this negative relationship between real depreciation and the supply of savings required to translate investment intentions into actual investment.

His model also has the merit of incorporating the debt crisis into its theoretical framework. While real exchange rate is considered as an exogenous variable determining the level of savings and investments, capital flows are endogenous in the sense that they are highly sensitive to the prevailing rate of interest at home under open economy conditions. Hence, a large scale capital inflow which would push down the domestic interest rate causes the domestic savings to contract, appreciating the local currency. Lower interest rates combined with an appreciated local currency in real terms would certainly stimulate both consumption and investment in nontradable goods sector such as real estate since the relative prices would change in their favor. At the end of the day, appreciated local currency would encourage the nontradable sector at the expense of tradable sector. However, the former is not known for its potential to generate foreign exchange denominated earnings with which to serve the accumulated foreign debt as a result of inflows. All in all, an increasingly heavier burden of foreign liabilities concomitant with capital inflows would not be matched by a greater ability to repay the foreign loan through the expansion in production capacity since nontradables do not contribute much to foreign exchange revenue. The accumulation of foreign debt built up to finance domestic consumption and investment bonanza to nontradable sector is a well-known recipe for emerging market debt crisis that has crippled growth in them in the past.

If we go ahead with real exchange rate as a policy tool extensively used by governments across the board, then a question arises as to why there arises a need for it. First of all, we should be clear where the essence of real exchange rate policies lies in, namely, in the real wage determination in international terms. Under open economy conditions, adjustments in the nominal exchange rates cause exogenous variations in the real wage rate (Bhaduri and Marglin, 1990). As long as devaluation rate exceeds inflation rate the international price competitiveness of the domestic economy will be enhanced and a positive trade effect on capital accumulation ensues if the sum of export and import elasticities with respect to price exceeds unity in accordance with the famous Marshall-Lerner condition. Given a high sensitivity of investments with respect to the profit margin, when a devaluation rate strengthening the international price competitiveness also leads to an improvement in profit share, a higher capacity utilization follows consequently and capital accumulation gains momentum since a decline in domestic consumption associated with a lower wage share is more than counterbalanced by investment growth. Under the conditions where devaluation rate is greater than inflation rate and the latter exceeds the wage growth, real wages can be lowered to boost growth through devaluation.

It does not seem surprising to find that the need for real exchange rate policies comes to the fore when market forces, left totally to their own devices, cannot take care of achieving full employment. To be more specific, sticky nominal wages may obstruct the free play of market forces in ensuring the full employment equilibrium. Under the free market conditions, the presence of unemployment is supposed to put downward pressure on money wages, which in turn would trigger a real depreciation by decreasing the relative price of nontradables which are by the way mostly labor intensive given a constant world price of tradables and a stable nominal exchange rate (Razmi, et. al., 2012) This real depreciation is expected to continue until full employment is reinstated through a faster rate of depreciation induced capital accumulation. The nominal rigidity of wages, however, might get in the way of market tendencies working towards the full employment equilibrium. Then, there could room for a manipulation of real exchange rates to kick off capital accumulation. Moreover, not only are real exchange rate policies necessary for overcoming the obstacles to attaining full employment equilibrium, but they are possible through adjustments in nominal exchange rate since the latter could be in governments' control at least in the short to medium run. Razmi, et.al. cite policy alternatives open authorities as various monetary and fiscal policies, saving schemes, restrictions on capital mobility, and foreign exchange accumulation.

This last point directly takes us to the recent history of real exchange rate policy among developing countries since the 1997 Asian crisis. What can be described as the "fear of floating" (Calvo and Reinhart, 2002) literature examines the intervention of governments in the foreign exchange markets. In their seminal paper, Calvo and Reinhart (2002) put forth that many developing countries which seemingly adopted the floating exchange rate regime have made systematical interventions in the foreign exchange markets to get control of the exchange rate in the wake of Asian crisis. Especially, during the 2000s, the main aim of these interventions on the part of governments proved to be an avoidance of having an overvalued local currency to keep a competitive edge in the world market. Levy-Yeyati and Sturzenegger (2007) also show that central banks could and actually did keep control of real exchange rate in the short to medium run through sterilization of capital flows.

There is a mounting evidence that many emerging market economies actually pursued an undervaluation policy as manifested in the huge accumulation of foreign exchange reserves after the late 1990s Asian crisis. Wary of a sudden reversal in capital flows they frequently and severely experienced during financial crises, many emerging market countries saw their foreign exchange reserves as a self-insurance policy against the whimsical nature of foreign finance (Subramanian and Kessler, 2013; Allen et.al., 2013; Goldstein and Xie, 2009). Moreover, by intervening in foreign exchange markets, they were able to get a competitive currency through the undervaluation of exchange rates. The actual size of intervention made in the foreign exchange market is quite telling. Bergsten and Gagnon (2012) calculate the size of intervention in foreign exchange markets to the tune of $1 trillion per year by more than 20 countries for several years. It is easy to see that the motivation behind the drive for a competitive currency is the economic strategy focused on trade surpluses as the main driver of economic growth (Subramanian and Kessler, 2013).

As noted above, there is a danger inherent in undervaluation policies from a political point of view. Undervaluation policies, if implemented for a long period, would create a series of political and economic tensions for international economic system. For one thing, those countries that run current account surpluses through undervalued currencies would flood export markets with cheap products, creating a deflationary pressure on deficit countries. At the end of the day, countries burdened by current account deficits would carry out policies aimed at cutting aggregate demand so as to keep their external balances under control, which is another source of deflation for them (Subramanian and Kessler, 2013). Undervaluation policies on the other hand, could result in an international economic order marked by a huge chasm between surplus and deficit countries. Immense current account surpluses held by countries pursuing undervaluation policies have made global liquidity abundant, thereby removing any barrier to financial excesses and asset bubbles (Bernanke, 2005). A so-called savings glut helped to open the gates of cheap and easy credits in advanced countries, boosting both consumption and financial speculation there. The frenzy of abundant liquidity conditions enabled the debtor countries to live beyond their means only to lead to the financial crash with the Great Recession in 2008.

So far we have mentioned only about the undervaluation policies. There is another dimension into the real exchange policies pursued by developing country governments. Bresser-Pereira (2002) points out to what he called as the "exchange rate populism", a widespread phenomenon in many developing countries suffering from chronic current account deficits. When disinflationary policies put into practice, exchange rates are usually kept very low to fight inflation since high interest rates would attract foreign savings, which in turn could lead to the appreciation of local currency. Overvaluation and low inflation makes imports less expensive and artificially raises local wages in real terms. Thus, it gives a huge bonanza to domestic consumption resulting in a widening current account deficit. Then this society enjoys a consumption level beyond its means in the short term. For this reason, a high consumption level beyond disposable income as indicated by yawning current account deficits provides popular support for overvalued exchange rates. But an ensuing balance of payments crisis would severely put an end to the fictitious welfare in the medium to long run. In discussing the political economy of exchange rate populism, Bresser-Pereira (2002) also stresses that higher yields associated with growth through foreign savings strategy are also welcome to the financial elites and rentiers in developing countries. Therefore, the exchange rate populism could rally massive support from a wide strata of society since both lower and upper classes are tempted by higher consumption and wealth made possible by overvalued local currency (Filho and Chamon, 2008; Frieden et al., 2001).

In sum, we showed that governments, especially those in developing countries, pay too much attention to real exchange rate to let it freely float in accordance with market forces of supply and demand. Some developing countries with current account surpluses drew a lesson from their past financial crises to accumulate foreign exchange reserves as a buffer against the boom and bust cycles of global financial flows through sterilized interventions in the market. Other developing countries which chronically ran current account deficits seized the opportunity opened up by relatively easy terms of abundant global liquidity during the period leading up to the Great Recession in 2008 and in its aftermath (by means of quantitative easing policies pursued by advanced countries in their bid to fight the fallout of financial crisis). These countries managed to attract capital flows to finance a higher level of domestic consumption by offering high yields to investors in a global economy deep into the secular stagnation (Summers, 2013).

Many developing country governments did their best to prop up distortions of real exchange rate from its long run equilibrium in either way.

But again, we test the validity of the real exchange rate as an exogenous variable by carrying out the Davidson-MacKinnon (1993) test in FE model using the first lag of the variable of interest as its own instrument (5.14). So estimates are taken from the Fixed Effect (within) Instrumental Variable estimation. Here we run FE-regression by including per capita income at nominal GDP. DM test statistics yields a prob-value of almost 0.0766, and thus the null hypothesis that covariance between the regressor and error term is zero can be accepted.

Table 5. 14 : The test for exogeneity.

Davidson-McKinnon test of exogeneity	
F (1, 385)	P-value
3.153129	0.0766

To be on the safe side to address any concern over potential endogeneity bias, we would like to search for an estimation methodology treating the real exchange rate as an endogenous variable. We should note that it is extremely difficult to find economic variables affecting the real exchange rate without having any impact on the manufacturing share in national output. The GMM estimators take care of this setback by using the lags of levels and differences of endogenous variables as instruments. For this end, we turn to the dynamic panel estimation techniques by adding the lagged value of the dependent variable as an additional covariate into the model. The change in the model setting allows us to make use of the generalized method of moment estimators (difference and system GMM) which generate internal instruments not only for the lagged values of the dependent variable but also for any regressor deemed endogenous in the model. The dynamic panel GMM estimations run for the model with the unadjusted real exchange measure also accounts for the endogeneity bias which might have been introduced by some common shocks affecting both the relative prices, income per capita and the manufacturing output share such as changes in productivity.

Table 5. 15 : The Panel GMM estimations with the real exchange rate index adjusted for the BS effect.

Dependent variable: Manufacturing share in GDP				
	2-step difference		2-step system	
Independent variable	Coefficient	t-statistics	Coefficient	t-statistics
Lagged manufacturing share	0.518	4.61***	0.915	24.81***
ln per capita income, at $PPP	0.451	0.76	0.345	0.57
ln per capita income sq, at $PPP	-0.0213	-0.79	-0.014	-0.52
ln OVERVAL	-2.56	-2.51***	-1.305	-2.00**
2000s+	-1.76	-4.02***	-1.121	-5.47***
Constant			-0.47	-0.14
Number of instruments	38		41	
Number of observations	390		429	
Hansen test of overidentifying restrictions, $p > \chi^2$	0.341		0.453	
Arellano-Bond test for AR(1)		-2.72***		-3.65***
Arellano-Bond test for AR(2)		-2.10**		-2.07**

Since the 2-step GMM yields standard errors robust to heteroskedasticity and autocorrelation within panels, we apply small sample correction to get t-statistics. We also implement Windmeijer’s finite-sample correction for the two-step standard errors since the GMM is an asymptotic estimator and may yield downwardly-biased standard errors in small samples. Both lagged manufacturing share and ln OVERVAL (or ln RER_pwt) are treated as endogenous while the exogeneity of ln GDP per capita, its quadratic term, and the time dummy representing the 2000’s is assumed. To avoid overfitting the model, we limit the lags used in GMM-style instruments and collapse the instrument matrix for the endogenous variables, so the number of instruments does not exceed the number of cross-section units as a rule of thumb. Moreover, since we could reject the null hypothesis of the Arellano-Bond test for the first and second-order autocorrelation, we back off one period and start using the third lag of the dependent variable as instrument.

It is important to assume that there is no contemporaneous correlation across the idiosyncratic errors for the robust estimation of coefficient standard errors by the panel GMM estimators, and the inclusion of time dummies allows us to get around this potential problem. The inclusion of time dummies leaves the basic results unchanged, but we did not report them here since they create collinearity problem with the 2000s dummy.

Table 5. 16 : The Panel GMM estimations with the real exchange rate index unadjusted for the BS effect.

Dependent variable: Manufacturing share in GDP				
	2-step difference		2-step system	
Independent variable	Coefficient	t-statistics	Coefficient	t-statistics
Lagged manufacturing share	0.776	8.39***	0.938	30.23***
ln per capita income, at $PPP	0.218	0.39	0.222	0.40
ln per capita income sq, at $PPP	-0.009	-0.36	-0.0086	-0.34
ln RER_pwt	-0.858	-3.21***	-1.11	-3.61***
2000s+	-0.81	-3.47***	-0.433	-1.96**
Constant			-1.433	-0.62
Number of instruments	38		41	
Number of observations	390		429	
Hansen test of overidentifying restrictions, $p > \chi^2$	0.412		0.424	
Arellano-Bond test for AR(1)		-3.15***		-3.64***
Arellano-Bond test for AR(2)		-1.92*		-1.91*

The coefficient before both measurements of the real exchange rate index is invariably negative and statistically different from zero in the 2-step difference and system GMM estimations (Tables 5.15-16). Moreover, the coefficient before *ln OVERVAL* in the 2-step difference GMM estimation is almost equal to the AMG estimation for it in Table 4 above. We should also note that the time dummy capturing the globalization's effect is also significantly below zero regardless of the model settings, confirming that the premature deindustrialization accelerated with the 2000s. On the other hand, we cannot verify the quadratic relationship between economic development and industrialization since the coefficients before the income per capita variable and its square prove to be insignificant. We, however, can justifiably reason that the effect of economic development may have been captured by the lagged manufacturing share in the dynamic panel setting. Hansen test also assures us that all instruments are valid, and we restrict the instrument matrix to avoid overfitting the model by limiting the lags used for endogenous variables. Since the error term is suspected to suffer from nonsphericity within the GMM framework, the Sargan test statistic becomes inconsistent as an overidentification test for the moment conditions (Roodman 2009).

We can conclude that the detrimental effects of overvaluation on the manufacturing output share in developing countries cannot be attributed to any endogeneity bias inherent in the real exchange rate variable.

5.2.4.5 The role of inequality, supply chain, and institutional shocks

The role of unequal income distribution, backward participation into global value, and weak institutional quality chains as an explanation for premature deindustrialization has been missing from the analysis so far. Since the data on institutional quality and global value chains have relatively recently been compiled and the inclusion of them in the baseline regression models would result in an immense loss of observations. For example, World Governance Indicators dataset starts with the year 1996 estimations while our dataset goes back to 1960. While controlling for institutional factors by country fixed effects, we had to exclude its discussion due to the data limitation.

Now, we will develop a theoretical framework for analyzing the effects of inequality and growth shocks, supply chain disruptions, and regulatory innovations on the pace of industrialization in developing countries. We formulate the growth of manufacturing output share as a function of participation into global value chains, regulatory quality, and income distribution as follows:

$$\frac{\Delta\, Mfg}{Mfg} = f[\overbrace{gini}^{-}, \overbrace{exgr\_dvashm}^{\pm}, \overbrace{rq}^{+}, \overbrace{growth}^{\pm}]$$

where Mfg, exgr_dvashm, rq, and gini represent the growth of manufacturing value-added share in nominal income, the share of domestic value added share in gross manufacturing exports (a proxy for the degree of participation into global supply chains), regulatory quality, and Gini coefficient which measure income inequality, respectively.

When compiling our dataset, we use various sources such as World Bank's World Development Indicators (WB-WDI) and World Governance Indicators (WGI), Groningen Growth and Development Center/Economic Transformation Database

(GGDC/ETD), and OECD's Trade in Value-added database (OECD/TIVA) (Table 5.17).

Our dataset cover 18 developing countries from Latin America, Africa, East Asia, and Europe for 1995-2018. Instead of working with the variables in levels, we prefer to calculate their growth rates by the formula $(X_t-X_{t-1})/X_{t-1}$ to address any possible nonstationarity in series and interpret results in a more convenient way. The variables measured in terms of their growth rates has the advantage of generating valid moment conditions within the GMM framework.

Table 5. 17 : Descriptive statistics.

Variable	Description	Source	Mean	Standard deviation	Range (Min-Max)	Mean Growth Rate
pcincome	GDP per capita, (current $)	WB/WDI, Release: 23 November 2021	5857,5	5292,2	268,9 – 31997,3	6%
outshare	Manufacturing value added share in nominal GDP	GGDC/ETD, Release: 17 February 2021	19,03%	5,89%	7,44%-34,96%	-0,3%
EXGR_DVASHM	Domestic value-added share in gross manufacturing exports	OECD/TIVA, Extracted on 5 December 2021	71,51%	12,81%	41,87% -93,6%	-
gini	GINI coefficient,	WB/WDI, Release: 30 July 2021	48,83	8,76	26,05-64,8	-
rqe	Regulatory Quality	WB/WGI, Release: 30 July 2021	0,149	0,55	-1,074-1,61	-

Since GDP per capita at current dollars exhibits a time trend, we demean the series from its time trend. Then we compute the growth rate of the detrended series to obtain the deviations from the historical growth trajectory. Hence, the growth shocks could easily be evaluated in terms of their effects on the structural characteristics of the national economy while controlling for the steady state growth path.

Domestic value-added share of gross manufacturing exports is used as a proxy variable for the degree to which a developing country takes part in the global supply chain chains as downstream producer since it typically operates as backward participant into GVCs. The further a country is integrated into the global value chains, the lower the domestic value-added share of its gross manufactures exports will be since it has access to the worldwide production network which provides them with high-quality intermediate goods entering the final product. Hence, a rise in domestic value added margin will be interpreted as a sign of disentanglement from the supply chains due to some disruption to them.

The construction of domestic value-added share of gross manufacturing exports is based on the OECD, Inter-Country Input Output tables (OECD 2019). The useful matrices are described as:

W: 1 by NK row vector of value-added content at basic prices

X: 1 by NK row vector of gross output at basic prices

V: 1 by NK row vector of value-added to output ratio

Z: NK by NK matrix of intermediate consumption at basic prices

Y: NK by N matrix of final demand

A: NK by NK matrix of input coefficients

We start with NK by NK matrix $\mathbf{Z}$ of intermediate consumption where there are K industries and N countries. Each entry in the matrix simply, z_{ij}^{rs} shows the productive consumption of good i produced in country r by sector j in country s. When we postmultiply $\mathbf{Z}$ by $\mathbf{\hat{X}^{-1}}$, where $\mathbf{\hat{X}}$ is the diagonal matrix with the output vector X in its main diagonal, we obtain the input coefficient matrix **A**. Similarly, the value-added vector **V** is obtained by the matrix multiplication $\mathbf{W\hat{X}^{-1}}$. Now, the first equality yields the gross output vector as follows:

$$\boldsymbol{X} = \boldsymbol{AX} + \boldsymbol{Y}$$

$$\boldsymbol{X} - \boldsymbol{AX} = \boldsymbol{Y}$$

$$\boldsymbol{X} = (\boldsymbol{I} - \boldsymbol{A})^{-\mathbf{1}}\boldsymbol{Y}$$

where **L**= $(\boldsymbol{I} - \boldsymbol{A})^{-\mathbf{1}}$ is the global Leontieff inverse matrix. $\mathbf{L_{c,c}}$ is K by K diagonal block matrix of **L** which simply shows how much direct and indirect input is required to produce one more unit of output in country c. Thus K columns of $\mathbf{L_{c,c}}$ reflect the increase in the output of various industries as a result of one unit increase in the final demand for any industry in the country c. From the diagonal of block matrix **A**, we could construct $\mathbf{A_D}$, the off-diagonal elements would form the block matrix $\mathbf{A_F}$ where

A = $\mathbf{A_D}$+$\mathbf{A_F}$. Similarly NK by N block diagonal matrix $\mathbf{Y_D}$ can be formed from the matrix **Y** where the main diagonal block include K by 1 $\mathbf{Y_{ii}}$. NK by N matrix of $\mathbf{Y_F}$ with al zeros on its main diagonal is simply equal to **Y**-$\mathbf{Y_D}$. When we plug **A** = $\mathbf{A_D}$+$\mathbf{A_F}$ and **Y** = $\mathbf{Y_D}$+$\mathbf{Y_F}$ into the first equation above, we would get

$$\boldsymbol{X} = (\boldsymbol{A_D} + \boldsymbol{A_F})\boldsymbol{X} + (\boldsymbol{Y_D} + \boldsymbol{Y_F})$$

$$\boldsymbol{X} - \boldsymbol{A_D}\boldsymbol{X} = \boldsymbol{Y_D} + \boldsymbol{E} \text{ where } \boldsymbol{E} = (\boldsymbol{A_F}\boldsymbol{X} + \boldsymbol{Y_F})$$

The vector **E** simply represents the total sum of gross intermediate and final good exports. We now extract a direct value-added coefficient matrix $\widehat{\mathbf{V}}$ which is NK by NK diagonal matrix with value-added shares for countries and industries being on the main diagonal. Domestic value-added share of gross exports for all countries and all industries can be calculated by $\widehat{\mathbf{V}}(\boldsymbol{I} - \boldsymbol{A})^{-1}\boldsymbol{E}$. To be more precise we now extract a direct value-added coefficient vector $\mathbf{V_c}$ of 1 by K for country c from **V**. And we create K by 1 vector of $\widehat{\boldsymbol{E}}_{\boldsymbol{i}}$ with all entries being equal to zero except the one corresponding to the manufacturing industry. The domestic value-added share of gross manufacturing exports, the variable EXGR_DVASHM is nothing but $\mathbf{V_c}\boldsymbol{L_{cc}}\widehat{\boldsymbol{E}}_{\boldsymbol{i}}$.

If we further decompose $\mathbf{V_c}\boldsymbol{L_{cc}}\widehat{\boldsymbol{E}}_{\boldsymbol{i}}$, we could easily see that it represents the exported value-added created not only by the manufacturing industry itself but also by any other local industries providing inputs to the manufacturing sector. When we continue from the last equation above, we isolate **X** on the left-hand side as follows:

$$\boldsymbol{X} = (\boldsymbol{I} - \boldsymbol{A_D})^{-1}\boldsymbol{Y_D} + (\boldsymbol{I} - \boldsymbol{A_D})^{-1}\boldsymbol{E}$$

where $\widehat{\boldsymbol{L}} = (\boldsymbol{I} - \boldsymbol{A_D})^{-1}$ is the local Leontief inverse which is NK by NK diagonal block matrix.

Direct domestic value added content of gross exports by the manufacturing industry itself can be calculated by $\widehat{\mathbf{V}}_{\mathbf{c}}\, \boldsymbol{diag}\, \widehat{\boldsymbol{L}}_{\boldsymbol{c}}\, \widehat{\boldsymbol{E}}_{\boldsymbol{i}}$. We can read the direct production requirements off the main diagonal of the local Leontief inverse. Indirect domestic value added content which reflects the contribution of other domestic input-providing sectors to gross manufacturing exports can easily be calculated from $\widehat{\mathbf{V}}_{\mathbf{c}}\, \boldsymbol{offdiag}\, \widehat{\boldsymbol{L}}_{\boldsymbol{c}}\, \widehat{\boldsymbol{E}}_{\boldsymbol{i}}$. We can read the local value-added contribution of upstream sectors incorporated in the exports of manufacturing industry from the off-diagonal elements of the local Leontief inverse. The imported intermediate products entering the gross manufacturing exports could also contain a certain amount of domestic value added which had once been exported for the input-producing foreigners. The residual left, $\mathbf{V_c}\boldsymbol{L_{cc}}\widehat{\boldsymbol{E}}_{\boldsymbol{i}} - \widehat{\mathbf{V}}_{\mathbf{c}}\, \boldsymbol{diag}\, \widehat{\boldsymbol{L}}_{\boldsymbol{c}}\, \widehat{\boldsymbol{E}}_{\boldsymbol{i}} - \widehat{\mathbf{V}}_{\mathbf{c}}\, \boldsymbol{offdiag}\, \widehat{\boldsymbol{L}}_{\boldsymbol{c}}\, \widehat{\boldsymbol{E}}_{\boldsymbol{i}}$ just shows the reimported domestic value added content of gross manufacturing exports. It represents the domestic value added content embodied in imported intermediate goods.

The Gini coefficient is a relative measurement of income inequality. A coefficient of 0 denotes perfect equality whereas 100 reflects perfect inequality.

The regulatory quality index quantifies the capacity of government to carry out policies and regulations which improve business environment by preventing unfair competitive practices, and avoiding discriminatory taxation, etc. All the composite scores of 193 countries in the WGI database are standardized with mean zero and standard deviation one, assuming normality. The standard normal z-score has a range of -2,5 to +2,5. As the z-score approaches to +2,5, it means the regulatory quality has improved in that country.

Without a priori assumption about causal relationship among manufacturing output share, regulatory quality, fairness of income distribution, and participation into supply chains, we run a Panel VAR model using the Arellano-Bond GMM estimator (Appendix B1 and B2). After implementing the Granger causality test to find that the direction of association runs from Gini coefficient, regulatory quality index, and the degree of participation into supply chains to manufacturing output share, we use the Cholesky factorization to obtain orthogonalized impulse-response functions to examine the effects of one standard deviation positive shocks to the Granger-causes on the manufacturing output share.

To avoid any model misspecification, we should start out with the determination of optimal lag order for our panel VAR model while making sure that the instruments used satisfy the orthogonality condition (Appendix B3). We set the maximum lag length at 3 and add up to 10 lags of the dependent variables as instruments for endogenous regressors (Table 5.18).

Table 5. 18 : Selection order criteria.

Lag	CD	J	J p-value	MBIC	MAIC	MQIC
1	0.9955911	129.337	0.6669048	-567.6637	-144.663	-316.4077
2	0.9897379	92.40134	0.9114143	-477.4095	-131.5987	-272.0031
3	-23.95225	62.59136	0.9776236	-380.0295	-111.4086	-220.4728

Maximum likelihood based model selection criteria are minimized at the first lag so the correct model specification requires a panel VAR model of order one. On the other hand, the Hansen's J-statistic provides strong evidence that the instruments are valid.

Assuming no a priori causality among the variables, we run 5-variate panel VAR model of order one by applying the Arellano-Bond panel GMM estimator. The endogenous regressors in the first difference equation are instrumented with the predetermined values of dependent variables in levels from the second through the tenth lag. The reduced-form coefficients and their z-scores are given in Table 5.19.

Since the reduced-form coefficients are hard to interpret due to its a-theoretical nature, we would like to transform the first-order panel VAR model into an infinite order vector moving average process. Since the stability of the VAR model is essential to the transformation, we obtain the eigenvalues of the companion matrix to verify that each has modulus strictly less than one (Figure 5.3).

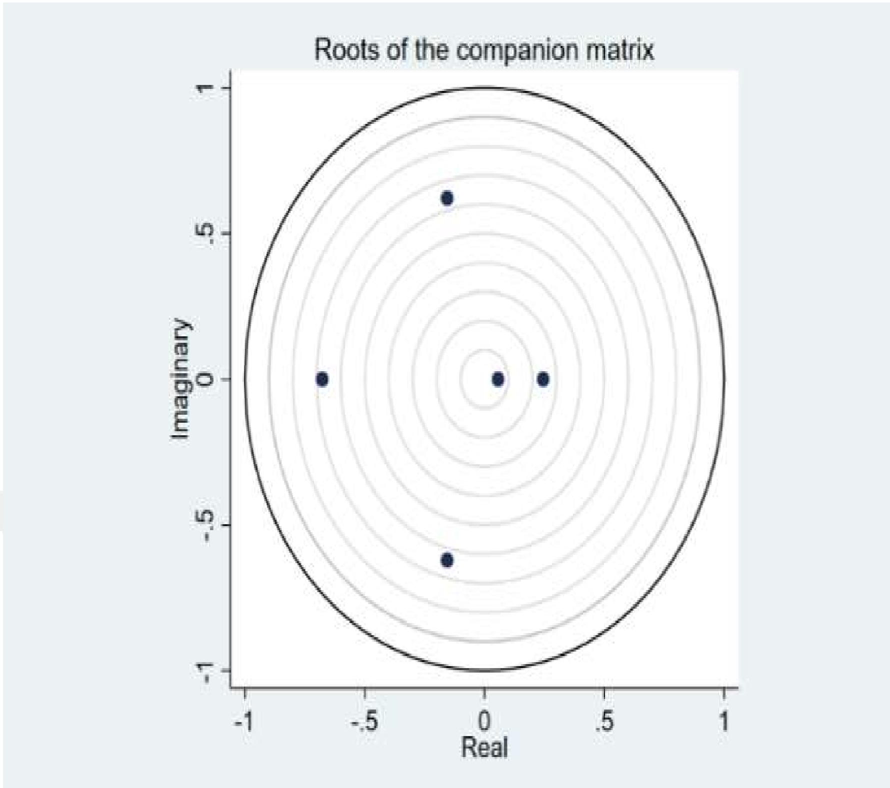

Figure 5. 3: Eigenvalues of the companion matrix and the unit circle.

After the stability of the model is guaranteed, then we move on to estimating the impulse response functions to figure out the interactions among the dependent variables. Since the shocks or innovations in the reduced-form model are assumed to be correlated at a given point in time, a direct estimation of the impulse-response functions would not allow us to isolate one shock's effect from that of another. When we diagonalized the error covariance matrix, then we could single out the effect of shocks to one variable on the rest of the dependent variables. Since the diagonalization is quite sensitive to the order in which the dependent variables enter the model, we could run the Granger-causality test to help us to determine the causal ordering among the variables (Table 5.20).

Table 5. 19 : Panel VAR GMM estimation.

	Coef.	Z
g_outshare		
g_outshare (t-1)	-0.51495	-24.59***
g_gini (t-1)	-1.60587	-24.03***
g_rqe (t-1)	0.003239	6.24***
g_exgr_dvashm (t-1)	0.127298	5.42***
g_pcincc (t-1)	0.000792	20.02***
g_gini		
g_outshare (t-1)	0.143858	15.55***
g_gini (t-1)	-0.03904	-1.61
g_rqe (t-1)	0.000308	0.99
g_exgr_dvashm (t-1)	-0.00058	-0.06
g_pcincc (t-1)	0.000243	15.9***
g_rqe		
g_outshare (t-1)	1.848036	6.49***
g_gini (t-1)	-3.41643	-3.83***
g_rqe (t-1)	0.05306	2.23**
g_exgr_dvashm (t-1)	-0.2027	-0.55
g_pcincc (t-1)	-0.00104	-2.93***
g_exgr_dvashm		
g_outshare (t-1)	-0.39192	-18.71***
g_gini (t-1)	1.019447	14.76***
g_rqe (t-1)	-0.00025	-0.45
g_exgr_dvashm (t-1)	-0.14534	-3.74***
g_pcincc (t-1)	0.00014	3.9***
g_pcincc		
g_outshare (t-1)	81.04983	10.5***
g_gini (t-1)	-258.379	-14.27***
g_rqe (t-1)	0.395225	2.42**
g_exgr_dvashm (t-1)	202.0731	13.21***
g_pcincc (t-1)	-0.0419	-5.11***
Number of observations	378	
Number of panels	18	
Hansen's J chi square (200)	200.72	p-value = 0.472
Instruments	1 (2/10). (g_outshare g_gini g_rqe g_exgr_dvashm g_pcincc)	

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Except a few cases, we could establish that all the variables mutually Granger-cause each other, indicating a high degree of predictive causality. Gini coefficient, regulatory quality z-score, domestic value-added share of gross manufacturing exports, and economic growth rate all do Granger-cause the growth of manufacturing value added share in national income, allowing us to treat the latter as “response” variable. The similar arguments could be extended to the growth rate with the caveat that regulatory quality rate does not Granger cause per capita income growth at one percent significance level.

It is interesting to note that we could establish one-way causality direction which runs from Gini coefficient to domestic value-added margin and regulatory quality. Inequality which might be related to the share of wages in national income could determine the degree to which a country takes part in somewhat labor-intensive segments of global value added chains. The income distribution has also impact upon the regulatory quality of business environment. The last point is not be as surprising as it might seem at first glance since a fair income distribution could lead to an improvement in overall institutional quality. Another intriguing point relates to the disassociation between institutional framework and backward participation into global supply chains as reflected by the domestic value-added margin in manufacturing exports. The spread of value chains into low-wage countries with poor institutional quality could plausibly bar us from establishing a direct link between them.

Table 5. 20 : Panel VAR Granger causality test.

Equation / Excluded	Chi2
g_outshare	
g_gini	577.437***
g_rqe	38.978***
g_exgr_dvashm	29.333***
g_pcincc	400.912***
ALL	1085.116***
g_gini	
g_outshare	241.698***
g_rqe	0.987
g_exgr_dvashm	0.004
g_pcincc	252.739***
ALL	579.624***
g_rqe	
g_outshare	42.065***
g_gini	14.688***
g_exgr_dvashm	0.302
g_pcincc	8.568***
ALL	57.282***
g_exgr_dvashm	
g_outshare	350.076***
g_gini	217.967***
g_rqe	0.206
g_pcincc	15.205***
ALL	480.72***
g_pcincc	
g_outshare	110.314***
g_gini	203.738***
g_rqe	5.832**
g_exgr_dvashm	174.506***
ALL	678.795***

Since we would like to identify the factors quickening the industrialization process, we consider the response of the growth of manufacturing output share to the impulses associated with one standard deviation positive shock to domestic value-added share of gross manufacturing exports, regulatory quality z-score, Gini coefficient, and per capita income growth (Figure 5.4).

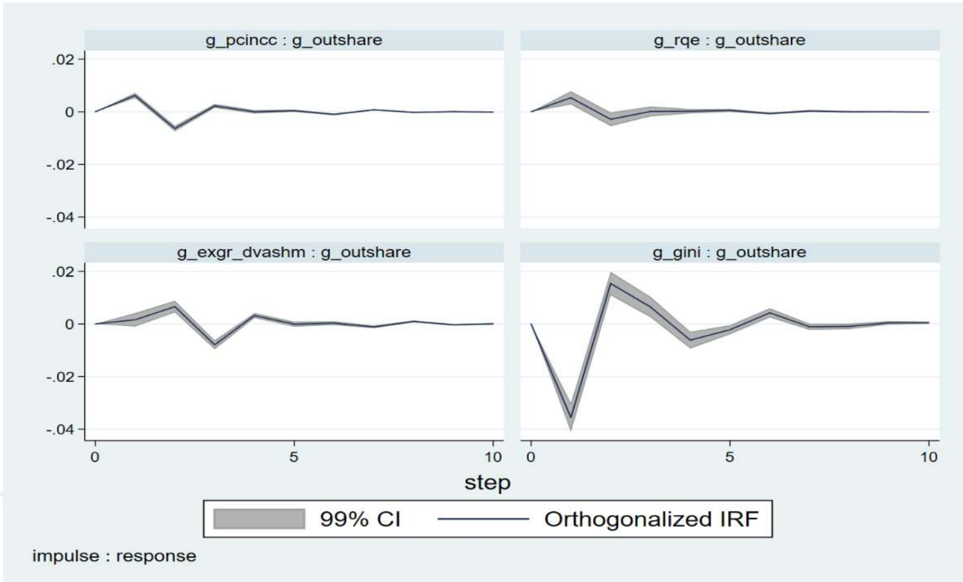

Figure 5. 4: Orthogonalized impulse-response functions.

According to the top left chart in Figure 5.4 growth shocks are nonlinearly associated with the rate of industrialization. Growth shocks such as total factor productivity enhancements or terms of trade improvements accelerate the pace of industrialization by up to 0,71%. But then the manufacturing output share starts to contract at a rate of 0,64% the next period, thus roughly neutralizing the initial gains achieved by growth shocks. This peculiar result could be ascribed to the inequality-increasing nature of growth shocks (Bandyopadhyay and Sun 2020; Halter et al. 2014, Barro 2000). When we isolate the effects of growth shocks on Gini coefficient, we argue that they could have deteriorating effects on income distribution over long-time horizon (Figure 5.5). Overall, we could claim that growth shocks positively contribute to the industrialization bid in the long-run but its contribution could be lessened by the deleterious effects of its inequality-increasing nature. Hence the government policies must make sure that each income group should get its own fair share in productivity gains or favorable international price trends.

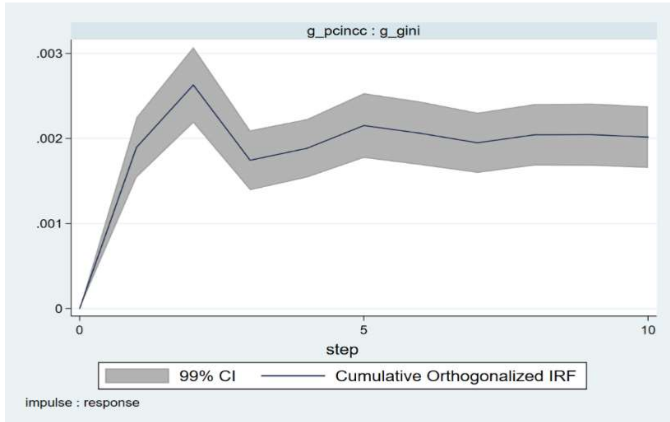

Figure 5. 5: Response of Gini to growth shocks.

The left bottom diagram in Figure 5.4 shows that the supply chain shocks which result in a higher share of domestic value-added margin in one unit of gross exports is nonlinearly related to the pace of industrialization. Given the volume of gross exports, a widening domestic value added margin is expected to boost the manufacturing share in total value-added. The tailwind provided by higher local content could reach as far as 1% on cumulative terms in two years. However, when a supply chain shock occurs, the participant countries eventually face an immense difficulty in procuring highly needed imported intermediate products so the increase in domestic value added share is accompanied by the deceleration in the industrialization process with a contraction of almost 1 percent, nearly wiping out value-added gains. A higher value added share combined with a decline in national income share could be explained by a contraction in industrial production due to the essential imported input bottlenecks. It, however, seems that the malign effects of a disruption to supply chains is more or less compensated by the resiliency of domestic manufacturing industry the following period. Faced by the shortages of essential ingredients of production, the countries could start to develop new competencies corresponding to intermediate input import substitution. Hence, the developing countries could have a chance of escaping the worst thanks to the ability of their manufacturing industries to adapt to supply chain shocks. The countries doubtlessly could do even better with a well-designed industrial policy aimed at replacing imported intermediate goods with their local substitutes with matching quality and cost.

We have unequivocal evidence that any improvement in regulatory quality boost the industrialization process. A new policy paradigm which leads to a leap in the country's regulatory quality z-score could quicken the industrialization process by speeding its growth rate up to 0,8 percentage points. Hence, the countries could accelerate its manufacturing sector growth in national by ameliorating the business environment where the holdup problems are largely eliminated and the contracts are enforced by means of a supportive government. Hence, improving regulatory quality comes out as a policy recommendation to reverse the fate of premature deindustrialization.

But the greatest obstacle to the industrialization process in developing countries lies in the way the national income is distributed among population. Since it mostly produces necessary mass consumption goods purchased mainly by low to middle income groups, a more skewed income distribution squeezes the market size of manufacturing industry. An inequality shock astonishingly decreases the growth of manufacturing output share by as much as 4 percentage points. However, an increase in social inequality which might be caused by the suppression of wage income and which might mean a profit bonanza to entrepreneurs could seem to work out its effect to expanding the manufacturing the next period, giving it a total spin of 2%. However, these cost gains absolutely fall short of offsetting the depressing effects of a shrinking market size for manufactures, leaving the overall effects of a more unequal income distribution at a minus 2,5% over the medium to long term. Thus, secondary income distribution policies such as progressive taxation, social transfers, improvements and enlargements in public education, health care and pension system would help support the industrialization process by creating a wide domestic market for manufactures.

We know that the stability of the panel VAR model and the validity of moment conditions depend on the stationarity of dependent variables, so we run panel unit root tests on them. Since we deal with a long panel with the time dimension (24 years) being greater than the cross-section dimension (18 countries), we apply Levin-Lin-Chu (LLC) panel unit roots test which does not suffer from size distortion as T/N ->0 asymptotically (Table 5.21). According to the LLC test statistics, we could strongly reject the null hypothesis that the panels contain unit roots. We would like to confirm this conclusion by the Hadri Lagrange Multiplier (LM) test (Table 5.22). The Hadri test has stationarity as its null hypothesis. According to the test results, all the variables except outshare and Gini are verified to be stationary.

Since we work with the growth rates of manufacturing output share and Gini coefficient, there is no reason for worrying about the random-walkness of them either.

Table 5. 21 : Levin-Lin-Chu unit-root test.

Series	Lag	Trend	Constant	Adjusted t*
g_exgr_dvashm	9	No	No	-14.6062***
g_outshare	9	No	No	-11.4589***
g_gini	9	No	No	-3.0633***
g_rqe	9	No	No	-13.8046***
g_pcincc	9	No	no	-12.0222***

Table 5. 22 : Hadri LM test.

Series	Lag	Trend	Constant	Z
g_exgr_dvashm	3	No	No	-0.4940
g_outshare	3	Yes	No	6.3150***
g_gini	3	Yes	No	5.8829***
g_rqe	3	No	No	0.2026
g_pcincc	3	Yes	No	1.3285

An analysis of the forecast error variance decomposition also confirms that except its own shocks the variability in the pace of industrialization is affected most by income inequality (Table 5.23). Almost a quarter of changes in the growth of manufacturing output share could be attributed to the inequality shocks.

Table 5. 23 : Forecast error variance decomposition.

Response variable and forecast horizon	Impulse variable				
	g_gini	g_rqe	g_exgr_dvashm	g_pcincc	g_outshare
g_outshare					
0	0	0	0	0	0
1	0	0	0	0	1
2	0.2106723	0.0046678	0.000413	0.0063746	0.7778724
3	0.236876	0.0057199	0.0072287	0.0124609	0.7377146
4	0.2392633	0.0056242	0.0168744	0.013016	0.7252221
5	0.2415107	0.0055471	0.0181851	0.012823	0.7219341
6	0.2398954	0.0055337	0.0180093	0.0127212	0.7238405
7	0.2415402	0.005578	0.0179453	0.0128163	0.7221203
8	0.2416048	0.0055877	0.0181286	0.0128944	0.7217844
9	0.2416624	0.005586	0.0182607	0.0128984	0.7215925
10	0.2416314	0.0055847	0.0182723	0.0128955	0.7216161

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6. CONCLUSION

We have shown three basic findings throughout this thesis. The first finding is that premature deindustrialization is widespread and well documented phenomenon across the developing world. Countries start to deindustrialize faster and earlier over time so many developing countries could not avoid losing their already narrow manufacturing base without maturing them in the first place. The second finding involves the impact of globalization on premature deindustrialization, that is, it works both as catalyst and accelerator for deindustrialization among many low and middle income countries as well as developed countries. Globalization quickened its pace in the 2000s and this period saw a significant amount of manufacturing output loss in many developing countries except those in East Asia. Third, overvaluation mainly associated with the unhindered flow of capital across the globe hurts the development of manufacturing industry and reinforces the deindustrialization tendencies already unleashed by the liberalization of trade regime since the 1980s. After diagnosing these unhealthy developments gripping the developing world, we found it more appropriate to devote the conclusion part to recommending some remedies for them.

If the premature deindustrialization is the disease, the cure might be industrial policy along with structural reforms towards ameliorating the institutional framework, especially in the case of low-income countries (UNECA, 2014; UNIDO, 2013). While it is quite important to improve institutional quality by upgrading regulatory quality in product and labor markets, providing stable macroeconomic environment, and ensuring the rule of law, these measures mostly address "government failures" (Rodrik 2005). Though government failures such as corruption, uncertainty about business rights, and wasteful government expenditures certainly impede the development of manufacturing industry which is highly sensitive to the institutional factors due to its contract-intensive nature (Dollar and Kidder 2017, Rodrik 2008), the binding constraint to re-industrialization in many developing countries is market failures due to learning-by-doing externalities and coordination failures (Hausmann et al., 2015; Cherif and Hasanov, 2019). However, tackling government and market failures is more intertwined than it might seem at first glance since the existence of effective and well-functioning governments is also necessary condition for removing market failures and pursuing industrial policies (Pritchett et al., 2018).

Timmer et.al. (2016) has linked the deceleration in global trade since 2011 to a reversal of international production fragmentation. Rodrik (2018) also asserts that developing countries would find it more difficult to join in with global value chains due to the nature of technological changes. Recent technological developments such as automation, robotics, and 3 dimensional printing tend to reduce the demand for unskilled labor (Reijinders et al., 2021), a fact which deteriorates comparative advantage of developing countries with large endowment of cheap labor in manufacturing. On the other hand, with the elasticity of substitution in the production function decreasing as a result of technological changes, it becomes harder for low and middle income countries to substitute unskilled labor for capital. Moreover, exports and global value chains lost their ability to generate employment with the new millennium. Compiling the Labor Content of Exports database at the World Bank, Cali et.al. (2016) calculate that total number of jobs per $1 million dollar of exports fell from 29 in 2001 to 11 in 2011 for a balanced sample of 32 countries including both advanced and developing ones alike. The future of developing countries is less likely to lie with industrialization through participation in global value chains.

We should also note that there is a renewed interest in Industrial Policy by international financial institutions as well. Cherif and Hasanov (2019) have recently published an interesting International Monetary Fund Working Paper, making a strong case for the return of industrial policy to the decision making table. They also mention about the warm acceptance of industrial policy by the World Bank after Justin Lin took the position of its chief economist in 2008 and make a long list of empirical works showing the positive impact of industrial policies (for example, Criscuolo et.al. 2019; Lane, 2017; Kalouptsidi, 2018).

Indeed, the need for industrial policy is more acute than ever given the bleeding of manufacturing output share in developing countries. Benhassine and Raballand (2009) contend that low income countries are in dire need of industrial policies since they have quite narrow and undiversified manufacturing base and government interventions could become successful despite its low likelihood of success in their case. On the other hand, the level of capital formation needed to commence and sustain catch up industrialization has risen over time since the labor saving nature of technological changes put more capital intensives techniques into place, aggravating the need for scaling up investments. As pointed out above, the potential for export led growth strategies seems to be exhausted since many countries strive to achieve the same goals by similar means and global markets become seemingly saturated with exports.

One of the main tenets of the industrial policy should be a great investment push to accelerate the pace of capital formation. To reverse the fate of deindustrialization facing developing countries, a great investment push is needed more than ever. Since new technology is mostly embedded in machinery and equipment (UNCTAD, 2016), the prime mover behind the productivity growth is the pace of capital accumulation. An extensive investment in productive capacity necessitates a qualified labor force adept at working advanced tools. In other words, a skilled labor force is indispensable to an industrial policy (Lall, 2004). Therefore, the activity level of industrial sector can only be increased through a higher level of investment per capita in developing countries. This also provides the means for improving productivity and diversifying the production structure. In this regard, late industrializers need to devote a larger share of national income to gross fixed capital formation to close the productivity gap with the global frontier. The absolute level of investments and their distribution between construction and machinery and equipment is a decisive factor for a successful catch up industrialization. Namely, investments should be more geared towards machinery and equipment rather than construction.

These are also compatible with the lessons to be drawn from the late successful catch up industrializers in the East Asia. The so-called East Asian Miracles went into great lengths accumulating the physical capital and encouraging more labor participation as well as increasing its educational attainment. In his seminal paper on the subject, Young (1995) explains the brilliant successes of Korea, Hong Kong, Singapore and Taiwan in raising the living standards on the back of high growth rates after the second World War by an increase in labor participation ratio, the share of investment as a percentage of Gross Domestic Product, and educational standards so the positive impact of total factor productivity thus is greatly lessened once both the quality of physical capital and labor force is correctly measured. He also adds that the reallocation of labor from agriculture to manufacturing also made a significant contribution to a rise in value added per worker.

We should also emphasize that the Asian Miracles did not blindly invest in creating productive capacity without taking its technological content into account. Spurring productivity gains is essential to an industrial policy. Sustainable improvement in labor productivity can only be achieved by avoiding to be trapped in labor intensive manufacturing. In this regard, the introduction of new production processes and advanced technology becomes indispensable to attaining increases in productivity. The example of Korea sheds light on the importance of large scale production. In the take-off stage, the country erected the biggest integrated steel mill in the world, built the largest shipbuilding factory, and made an extensive of use economies of scale in creating domestic automobile industry (Cherif and Hasanov, 2019).

Another aspect of the industrial policy involves the leading hand of the state (Cherif et al., 2016; Mazzucato, 2013). State may play a role in guiding private sector into the targeted sectors it would not otherwise enter or take pains to establish publicly owned enterprises to pave the way for developing sophisticated sectors (Wade, 2018). As long as the performance criteria for assessing the viability of investments is restricted to short term profitability measures, then the free market mechanism could hardly take care of venturing into highly sophisticated industries currently unknown to entrepreneurs. State also could be the pioneer of technological innovations and discoveries in sponsoring the research and development activities. Using the Survey of Business Strategies data for the period 1991 and 2008 based on more than 15,600 observations, Afcha and Lopez (2014) underline the encouraging effect of public subsidies on the decisions of Spanish companies regarding whether or not to undertake research and development activities. According to the multinomial logit regression results, the log odds ratio for companies in the sample suggests that it is 6.3 as more likely to observe a firm making internal and external research expenditure if it receives subsidies from central government.

We, however, should be aware of the fact that these research and development expenditures do not directly translate into productivity growth. Unless supported by a robust and diversified manufacturing base, money spent on research and development would not be able to live up to the high hopes attached to it. Only a diversified manufacturing base could lay the ground for learning linkages in an economy. Depending on the presence of learning linkages, resources devoted to research and development may have an impact on the acquisition of technological capabilities.

Otherwise, any allocation of resources to research and development activities or acquisition of patents would not go beyond being an indication of the degree to which a country holds scientific research in esteem (UNCTAD, 2016). It is also important to bear in mind that not all patents are applicable to the production process. Therefore, placing too much emphasis on research and development activities may divert policymakers' attention away from building up a diversified manufacturing base through gross capital formation. Research and development can only be effective so long as a diversified manufacturing base is present whereby learning linkages are established.

More importantly, the leading hand of the state becomes more relevant when it comes to fixing the market failures through government intervention. The standard policy recipe for developing countries has one premise that the main obstacle for economic development and convergence with high-income countries is the prevalence of government failures. Therefore, the traditional approach fails to go beyond recommending an improved business environment, maintained macroeconomic stability, upgrading in institutional quality, investments in infrastructure and education, minimum government intervention in the free play of market forces, and so on. However, these policies fell short of achieving a sustainable high long run growth trajectory. On the other hand, market failures are also at least as much a hindrance to the development of sophisticated sectors and homegrown technologies as government failures.

Market failures have to do with positive externalities such as learning by doing and spillovers effect or coordination failures (Rodrik, 2005). Since no productivity gains associated with learning externalities and/or spillovers effect can be appropriated by private firms, available resources could be suboptimally distributed across sectors. It is well known that advances in manufacturing could lift agricultural efficiency through mechanization but since private manufacturing firms do not stand to particularly derive immediate financial benefits from these spillover effects, a vast potential for overall technological improvement might go unexploited. On the other hand, coordination failures relate to the fact that the market size of manufacturing sector must reach a critical point first before further investments in complex industries and technologies could be made feasible since an intricate production network in modern sector necessitates the availability of many diverse complementary inputs. For example, many complementary inputs supplied by other industries should be present in the first place to build up an industry as complex as automobile sector (Hausmann et al., 2015). In the absence of a vast production network where producers are both suppliers and customers to each other, the economy could be trapped in low level equilibrium.

Last but not least, the industrial policy must be of comparative advantage defying nature (OECD, 2014). For developing countries to break the limits set by low value added and labor intensive manufacturing activities like assembling, they need to set the bar high and embark on industrialization path far beyond the one suggested by current relative factor endowments (Chang, 2002; Lin, 2012). In other words, the priority should be given to the objective of moving away from labor intensive production and staying away from unsophisticated services such as tourism. Cherif and Hasanov (2019) refer to as the moonshot approach to fixing market failures those policies based on going beyond the current comparative advantages with the leading role of state in removing the obstacles in the way of an ambitious and fast industrialization.

On theoretical ground, the modern version of comparative advantage theory as developed by the Hecksher-Ohlin-Samuelson model simply singles out the capital and labor ratio as the main barrier to entering sophisticated industries like aircrafts, electronics, and so on. With the technology being freely available, having enough capital could automatically translate into the development of advanced sectors. The message conveyed is that the only parameter developing countries should care about is the capital-labor ratio. Such a heavy focus on the capital-labor ratio misses the point, however (Chang and Lin, 2009). The development of new industries depends on the accumulation of industry-specific capital and technical knowledge since the technology is not freely available to any country contrary to the assumptions of the Hecksher-Ohlin-Samuelson model so a simple rise in the capital-labor ratio would not be enough to trigger the process of building up sophisticated sectors. Another omission within the theoretical framework of the standard comparative advantage model is the positive externalities associated with learning by doing. With the passage of time one industry initially at a disadvantage could attain efficiency and manage to reduce the average cost through learning by doing as cumulative output rises.

The experience of the East Asian Miracles is a case in point so what is theoretically plausible has been corroborated by evidence as well. Cherif and Hasanov (2019) create the revealed comparative advantage index for sectors in Korea and Taiwan between 1970 and 1990 to examine what would happened to their development trajectory if these countries had conformed to their initial comparative advantages back at the start of their takeoff. The revealed comparative advantage for good j in country i is simply calculated as follows:

$$RCA_{i,j} = \frac{\sigma_{i,j}}{\sigma_{w,j}}$$

where $\sigma_{i,j}$ and $\sigma_{w,j}$ represent the share of good j in country i's total exports and total world exports, respectively. Whenever the index is greater than one, then it reveals that this country has comparative advantage at that good.

Using the World Bank dataset, Cherif and Hasanov especially chose the period between 1970 and 1990 in which a comprehensive state intervention to encourage targeted sectors like electronics, shipbuilding, and automobile went ahead with full steam. In 1970, both countries' comparative advantage seem to have lied in such unprocessed commodities as raw silk and vegetables. In 1970, Taiwan had thirteen machinery and transport equipment industries with a revealed comparative advantage being greater than one, with most of them in the category of textile and leather machinery, and none of them in the subcategory of electronics and other sophisticated machinery. Similarly, in 1970 Korea had only three industries with comparative advantage and these were also in the category of textile and leather machinery and mechanical parts. At the beginning of their economic development, both Korea and Taiwan had an initial comparative advantage in raw materials and technologically unsophisticated machinery and equipment such as sewing machines. Particularly, neither of them had a comparative advantage at electronics and other advanced technologies. By 1990, Taiwan had comparative advantage at 64 industries constituting one third of its total exports with most of them being in the category of electronics and electric machinery industries. The thirteen industries at which Taiwan had an initial comparative advantage back in 1970 simply disappeared from the list of export industries by 1990. The same pattern can be observed in Korea as well. In 1990, the top ten export industries wholly belonged to the highly sophisticated sectors such as electronics and shipbuilding. The revealed comparative advantage score of the three industries Korea had an initial advantage in 1970 went down below one in 1990. The point is that both Korea and Taiwan have defied their initial comparative advantages to build up electronic, shipbuilding, and automobile industries. By simply ignoring where their current comparative advantages had lied at the start of their push for industrialization, these countries were able to leap into technologically sophisticated industries.

To avoid a liberal use of the term “sophisticated”, we should be clear what is meant by it. Sophistication basically involves a sector having many production linkages and spillovers to the tradable sector so productivity gains could become self-sustaining (Cherif and Hasanov, 2019). High production linkages present the main conduit through which productivity gains are transmitted across different sectors. A sector with high backward linkages makes use of a high content of intermediate goods so an acceleration in its output sets in motion many input industries along with it. On the other hand, a sector with many forward linkages could control over the commanding heights of a production network so efficiency gains in that sector could easily spill over to downstream sectors which rely on its output. For example, the semiconductor sector bears the hallmarks of being a sophisticated sector since it could generate spillovers to downstream sectors like smart phones, laptops, and other consumer electronics. Or the automobile and aircraft industries are a part of a complex production network where they are customer to many input producers.

Labor productivity in the tradable investment goods such as machinery and equipment is of extreme significance in this regard. According to Herrendorf and Valentinyi (2012), aggregate total factor productivity differences across countries largely stem from productivity differences in equipment, construction, and food sectors, with the United States being taken as the benchmark country. The machinery and equipment sector stands out among others since the cross country disparity in sectoral total factor productivity is largest there and the systematic productivity gap in that sector is larger than the gross domestic product disparity.

Since upstream industries with many forward linkages are suppliers to many other sectors in an input-output network, the government intervention should target them from a social welfare perspective (Liu, 2019). Market imperfections originating in financial and contracting friction may result in less than optimal input use in downstream sectors and these distortions spread through the upstream sectors in the production network. Thus, the upstream sectors could thus become the magnet for market distortions because the misallocation of resources due to the imperfections could tend to have the snowball effect on them through backward linkages. Then, Liu notes that Korea's heavy chemical and industry push in the 1970s and the China's industrial policies in the 2000s targeted upstream sectors with high distortion centrality and generated positive network effects.

Cherif and Hasanov (2019) also propose a measure of sophistication for goods and services based on the share of research and development expenditures in net sales or value added and the number of patents issued. They single out the electronics, machinery and equipment, pharmaceutical products, aerospace, and motor vehicles as manufactures with high research and development intensity and patent generation.

Cherif and Hasanov (2015) also underscore the importance of creating domestic innovators to avoid dependence on multinational companies in technology creation. They cite the example of Malaysia to explain how the lack of domestic technology creation might give rise to a lower productivity growth in the long run. After the liberalization reform in the mid 1980 following the debt crisis, Malaysia embrace the foreign direct investment led export orientation strategy. The country was quite successful to attract many multinational companies which helped to diversify its export basket as a result of the incentives being offered to them. Malaysia, however, failed to raise its productivity growth. Total factor productivity grew on average by a meagre 0.8 percent per year in the period between 1970 and 2010. Manufacturing gross value added per worker also remained significantly lower in Malaysia than Korea and Taiwan. The stagnant productivity growth in Malaysia can be attributed to the lack of homegrown technology creation as proxied by the number of patents granted in the United States and low level of research and development as a percentage share of national income (around 1 percent of gross domestic product in 2011 compared to 4 percent in Korea). Hence the reliance on multinational companies for technology transfer did not pay off in Malaysia. On the other hand, Taiwan and Korea developed their local technologies and recorded significant productivity gains as a result of technological innovations created by domestic firms.

Multinational firms strategically choose to source simple content to local producers and send the profits they have earned back to their headquarters (Cherif and Hasanov, 2015). We have already shown that the participation in the supply chains of multinational companies did not help to reverse deindustrialization unfolding in developing countries. Participation in global value chains may come at a price of lower domestic value added share in unit exports as a result of processing imported inputs extensively. In this regard, it may be suitable for developing countries with some base in industrial production to give a chance for the imported intermediates substitution strategy adopted by China (UNCTAD, 2016). The downsides of entrance into international production networks could be ameliorated by adopting this strategy aimed at substituting imported high tech components with locally produced intermediate products. Without developing capabilities for producing technologically intensive components in the supply chain, nothing meaningful about industrialization could be achieved and the industrial structure built around the mid-level technology could not be changed for the better.

We have also provided evidence that overvaluation associated with the surge in capital flows into developing countries following the deregulation of capital accounts severely hurts the share of manufacturing industry in economy and is one of the main determinants of premature deindustrialization. Liberalization of capital accounts in many developing countries made them significantly vulnerable to the boom and bust cycles of financial flows. As a result of strong capital inflows, the local currencies get appreciated and the competitiveness of local manufacturing industries eroded so the need for stemming the tide of capital arises beyond doubt.

Recently, the case for implementing capital controls has been made stronger in the new literature on the effectiveness of free capital mobility. The evidence is still missing about the link between capital account liberalization and economic growth (Rodrik and Subramanian, 2009; Jeanne et al., 2012). On the other hand, it is well shown that the real exchange rate appreciation episodes usually end up in balance of payment crises which badly affect economic growth and the overvaluations tend to increase the likelihood of a real exchange rate crisis which results in large devaluations (Goldfajn and Valdes, 1996). Moreover, undervaluations in developing countries stimulate economic growth by giving a boost to manufacturing industry (Rodrik, 2008). Hausmann et.al. (2005) show that growth accelerations which have historically been highly unpredictable phenomena tend to be correlated with real exchange rate depreciations. It is also in complete agreement with the broad thrust of our argument that standard policy reforms cannot explain rapid acceleration in economic growth which persist for at least 8 years, and the positive impact of financial liberalization is limited only to unsustained growth accelerations.

Rodrik and Subramanian (2009) also imply that capital controls should be implemented without fear whenever necessary. While foreign direct investments which involve some technology and skill transfer and usually has longer duration in the recipient country are traditionally favorably looked upon as a form of external finance as opposed to its fickle forms like portfolio investments and other debt related inflows, the type of capital inflows becomes irrelevant when its size is huge enough to cause real appreciation and undermine the competitiveness of manufacturing industry. Even such international financial institutions as the International Monetary Fund which has historically been a staunch champion of free capital mobility across borders have come to embrace the idea that capital control should be present in the macroeconomic policy toolkit for some countries in financial distress (IMF, 2012). Now it seems that the Fund chooses to sound a more cautious tone in recommending the gradual financial liberalization as well as recognizing that one size fit all approach does not work since costs of financial deregulation may outweigh its benefits if it is done prematurely. Gallagher, Griffith-Jones and Ocampo (2012) propose the countercyclical implementation of capital account regulations for developing countries during boom times as an alternative to the foreign exchange reserve accumulation policy. They hint at the costs of the reserve accumulation policy since it involves yield differentials between the safe instruments denominated in hard currencies and the financial costs of attracting capital flows along with the consequent resource transfers from developing countries to developed ones (Gallagher and Ocampo, 2013).

In its recent re-evaluation of institutional view, the IMF recommends the pre-emptive use of capital controls and macroprudential policies on debt inflows to tackle financial risks (IMF 2022). Erten and Ocampo (2017) find that capital controls and FX-related regulations are effective in reducing the local currency appreciation in real terms. Capital controls in sync with macroprudential measures like placing limits on FX positions, restrictions on the amount of foreign currency lending by locals, the issuance of FX- denominated securities by domestic firms and loan-to-value ratios are useful in putting down the real exchange rate appreciation pressures by averting the overheating of economy as well as keeping inflationary forces in check (Nier et al. 2020, Erten et al. 2021, Prates and Fritz, 2016). Montecino (2018) also finds that capital controls can make the convergence of real exchange rate to its long-run equilibrium level significantly slower, increasing the persistence of misalignments. However, we must caution here that capital controls must not pass for necessary macroeconomic reforms and should not be at the disposal of beggar-thy-neighbor policies (IMF 2022). In addition to triggering race to the bottom, capital controls once degenerated into maintaining undervalued currencies do not help revive the lost manufacturing capabilities as shown in section 5.2.4.1. Another caveat might be about the administrative infrastructure required for the implementation of capital controls (Pasricha and Nier 2022). Though tax-like capital controls which are targeted to specific types of flows like real estate investments by nonresidents or portfolio debts are more useful due to their transparent character compared to broad-based quantity restrictions, they require an immense institutional capacity to implement and monitor them, to plug any leakage whenever necessary, and to fine-tune measures with changing conditions.

After the Great Financial Crisis in 2008-2009 more and more countries enlisted in indices used by international private and institutional investors, both developed and developing ones alike, resorted to capital controls to deal with the macroeconomic and financial problems related to the volatility of capital flows. UNCTAD (2019) shows that those countries applied most of the regulations to portfolio investment categories such as bonds, equities, derivatives, and money market instruments due to their erratic nature and points out that capital controls are more welcome in developing countries than in developed ones due to the higher exposure of the latter to international financial cycles. Ghosh et al. (2017) shows that the fallout of the Great Financial Crisis is least felt among the countries with regulated capital account. In addition, those nations with restrictions on capital flows recorded faster economic growth in the subsequent period than nations which had not regulated cross-border finance.

A new literature has recently emerged on the social welfare effects of introducing temporary capital controls. Given the presence of learning externalities in manufacturing, the welfare loss of capital flows-induced deindustrialization through real exchange rate appreciations can be limited by the introduction of capital controls on inflows in emerging market and developing countries (Yepez, 2021). Pecuniary externalities associated with external finance may distort the financial decisions of emerging market participants (Korinek, 2011). As a result, private agents may indulge themselves in raising too much foreign debt, assuming excessive financial risks, and incurring short term loans, thereby inadvertently contributing to the buildup of financial fragility in the economy. In other words, emerging market participants do not internalize the pecuniary externalities related to the financial fragility when they jointly contribute to its formation since they normally take macroeconomic parameters such as asset values and exchange rates as granted. When the financial shocks knock on the door, then the financial fragilities resurface so that real depreciations in local currency and collapse in asset prices chip away at the value of collateral assets. Hence the access of private market participants to external finance gets greatly limited due to the deterioration in their balance sheets, and then domestic spending declines and aggregate demand contracts with the financial crisis spreading through the real economy. The point of putting prudential capital controls on financial flows to developing countries in place is thus to make private agents internalize the financial fragility along with its pecuniary externalities by aligning private and social costs of financial decisions taken jointly by them. Restricting capital inflows during boom times through prudential regulations and steering them into less volatile categories such as foreign direct investments mitigates the potential damage the sudden stops or even reversals in them may inflict upon the aggregate demand during the bust times (Jeanne and Korinek, 2010). Hence, the capital controls would serve the purpose of reducing macroeconomic volatility and improving consumer welfare.

Magud et al. (2018) found that capital controls applied to inflows have been effective in making monetary policy more independent and changing the composition of capital flows but they are not so successful when it comes to reducing real exchange rate pressures. The last point, however, may have to do with the way countries carry out regulations in their capital account. To be successful, capital controls need to be strong enough and be assisted by macroprudential policies. They should by no means pass for necessary macroeconomic reforms.

The success of capital controls depends largely on the strength of the constrains they impose on the average value of returns on financial flows to be made from the currency's expected appreciation and interest rate differentials (UNCTAD, 2019). Moreover, the restrictions on capital inflows in the recipient countries work more effectively as long as they find their counterparts in the source countries (IMF, 2012). In other words, if source countries apply effective regulations against capital outflows, then the capital controls on inflows would have higher likelihood of success at the other end. This policy could plausibly in the interests of source countries since they would be able to direct financial resources created by monetary expansion into productive investments at home and to plug the leakage of monetary stimulus into financial investment overseas (UNCTAD, 2019). Another condition for success involves the determination of decision makers in defining the policy framework. Capital controls should be long lasting regulations on cross country financial flows in the first place because temporary limitation could fall short of doing the trick. And they should also be comprehensive in their application since sometimes the blurring lines between different types of capital inflows may compound the difficulties of achieving predetermined objectives. Capital controls may aim at encouraging less volatile categories of capital inflows such as foreign direct investments and discouraging speculative short term capital such as portfolio and other debt related investments. Blanchard and Acalin (2016) warn that foreign direct investment flows could behave quite similar to portfolio debt flows in terms of reacting to short term changes in the United States monetary policy rate rather than to medium term underlying economic fundamentals of the destination country.

Last but not least, capital controls should be part of a wider macroeconomic policy framework for their success. To avoid the risk of economic overheating any curb on capital inflows should be accompanied by macroprudential reforms. In this regard, regulation of domestic financial institutions acquires an ever important significance. Among others, financial intermediation at home should be improved so as to encourage domestic savings. We should bear in mind that the type of financial sources is not neutral for growth (Rodrik and Subramanian, 2009). In other words, domestic savings and foreign finance are not identical when it comes to financing the gross capital formation because capital inflows tend to appreciate the real exchange rate, thereby eroding the competitiveness of tradable sector at the host country. Since a rise in domestic savings reduces the net capital inflows to finance investment, it tends to give rise to a real depreciation with all its favorable effects on manufacturing industry. Thus an improvement in financial sector helps a developing country to increase gross capital formation as long as it can trigger a significant rise in domestic savings enough to substitute the net capital inflows. Higher capital adequacy ratios and other capital requirements may help to base domestic financial institutions on strong foundations and to contain credit fueled economic growth. Limits on currency mismatches may help to reduce the open foreign exchange position nonfinancial institutions could carry on their balance sheets. But these policies must also fully cover foreign exchange derivatives such as swaps used by some developing countries with advanced financial markets (UNCTAD, 2019).

Our last remarks will be made about what possible contribution foreign trade could play in reversing the fortune of developing countries. Given that premature deindustrialization has accelerated especially in the 2000s, it seems that many developing countries fell prey to trade globalization. Trade globalization worked mainly towards flooding the world markets with exports and many late industrializing countries tried tooth and nail to get the same objective with the same means, thereby reducing the possibilities for success. International trade, on the other hand, is especially important for developing countries to have access to export markets and thus attain economies of scale so as to break the limits set by the narrow size of domestic markets. Therefore, we should avoid making sweeping statements about the role of foreign trade and instead pay attention to the available details of its structure to reach at informed conclusions.

Prior to the covid-19 pandemic, we have already observed that global value chains were far flung across the borders and could not spread more because of the exhaustion and saturation of the possibilities of slicing up production network further (Rodrik, 2018). The covid-19 pandemic just reinforces these tendencies by disrupting the supply chains due to the forced lockdowns and contracting global trade. If one response to these shocks might be an acceleration of reshoring and near-shoring in those industries hit hardest by pandemic-related supply disruptions, another could be to put more emphasis on creating regional supply chains (ILO, 2020). In a world ravaged by trade wars, pandemic, and other external shocks, the rational action should be to diversify supply base to get around a heavy dependence on high risk sources and build up supply chains in the regions where the products are consumed (Shih, 2020). Hence, the trends in the world economy favored regionalization over globalization more forcefully for some time.

Given these general trends, we can now take a closer look at the nature of foreign trade in the developing world. UNCTAD (2016) importantly notes that trade in manufactures mainly takes place among countries of similar per capita income. The main trade partner of developed countries for manufactures are other developed countries. In 2013, the share of intra group trade in developed countries' manufacturing trade with the world was as high as 62 percent and Asia constituted more than half of their exports to developing regions. And the same pattern goes with the developing countries especially after the dramatic rise of South-South trade (Hanson, 2012). Developed countries had used to be the main trade partners of developing countries in the past but the picture started to radically change in the 2000s with the ascent of East Asian manufacturers. Those developing countries in West Asia and North Africa, sub-Saharan Africa, and Latin America and the Caribbean have been in deep trouble with stagnated industrial sector and thus run an overall widening trade deficit. Developed countries appeared on the top of both their export destination and import source list, and developing Asia stood out as their main supplier of imports of manufactures among other developing regions. The main destination of their manufactures export in developing world tends to be located in the same region. Therefore, when we more closely examine the foreign trade profile of developing countries suffering from deindustrialization, an interesting pattern appears that their exports to the world mostly involves unprocessed commodities while their intraregional exports are substantially composed of manufactures and processed commodities. For example, in 2014, 57 percent of African exports to the world consisted of unprocessed commodities while manufactures and processed commodities accounted for 42 percent and 22 percent in the intraregional trade of Africa, respectively. This was also the case with South America. The share of mostly high skill manufactures in the intraregional trade of South America stood at 50 percent while more than half of its exports to the world were made up of unprocessed commodities in 2014. It is important to state that the reorientation of exports of Africa and South Africa from developed countries to other developing regions, particularly Asia would not help either because these regions mostly exported unprocessed commodities to developing Asia. Now, it becomes clear that only more intraregional trade in prematurely deindustrializing regions may help them to overcome the ordeal of exporting low value added unprocessed commodities because intraregional exports were more about manufactures and processed commodities than exports to other regions were.

Given the bleak prospects of global trade slowdown (Krugman, 2020) and detrimental effects of trade globalization on industrialization attempts in the developing world, intra-regional trade should be encouraged for developing countries to develop their manufacturing industry and achieve economies of scale. Hence, the regional integration may offer big opportunities for developing countries to diversify their manufacturing base, generate well paid employment, and to overcome their dependence on low value added production.

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APPENDICES:

APPENDIX A : Tables

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Table A.1 : The value-added share of sectors by regions, 1960-2010, %.

	Sub-Saharan Africa					Latin America					Asia					Middle East and North Africa				
	1960	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**
Agriculture	37,38	29,15	24,69	24,38	21,66	12,40	10,94	9,87	7,84	7,23	14,93	21,24	12,68	8,98	8,13	23,91	24,43	23,42	21,32	20,20
Mining	8,72	6,64	11,79	10,36	10,30	7,39	6,38	8,19	6,63	11,59	3,00	3,58	3,05	3,13	3,26	2,37	4,21	3,34	3,97	6,04
Manufacturing	9,20	14,62	13,94	11,94	9,74	18,14	21,10	22,34	19,53	16,42	23,11	24,45	26,80	26,04	24,74	17,90	18,86	20,42	20,34	19,40
Utilities	2,10	2,72	2,43	2,19	1,73	1,84	1,53	2,26	2,84	2,31	2,07	1,71	2,24	2,63	2,40	0,94	0,93	1,40	1,64	1,52
Construction	4,79	6,29	4,80	4,31	5,84	6,62	8,08	5,22	5,92	6,94	5,32	5,48	6,25	5,64	5,69	2,74	3,80	3,87	4,10	4,47
Trade, restaurants and hotels	13,33	13,33	15,13	16,01	17,58	17,18	17,38	18,07	16,31	15,77	17,63	17,55	17,91	18,22	18,78	15,45	11,99	11,76	12,35	12,35
Transport, storage and communication	8,04	7,46	7,50	8,09	8,80	7,98	5,99	7,56	9,48	8,65	7,75	6,74	7,95	8,30	8,18	5,23	4,92	6,97	7,13	7,64
Finance, insurance, real estate and business services	2,95	4,66	5,36	7,65	8,87	10,41	10,80	10,06	11,00	11,44	11,26	6,57	10,43	11,96	13,01	15,72	17,01	15,35	14,93	13,97
Government services	10,39	11,64	11,46	11,76	12,08	7,47	7,18	6,50	7,34	7,87	7,46	6,94	6,79	7,96	8,23	7,46	6,75	6,88	7,72	8,01
Community, social and personal services	3,12	3,48	2,90	3,31	3,40	10,58	10,62	9,92	13,12	11,78	7,47	5,74	5,90	7,15	7,58	8,26	7,11	6,59	6,50	6,41

Table A.1 (continued) : The Value-added share of sectors by regions, 1960-2010, %.

	North America					Europe				
	1960	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**
Agriculture	3,68	3,11	1,64	0,97	0,94	8,39	7,31	4,90	3,26	2,35
Mining	2,02	2,19	1,52	1,09	1,69	1,22	1,43	1,53	1,66	1,89
Manufacturing	23,93	19,56	15,90	14,27	11,09	29,76	27,99	24,25	22,56	16,87
Utilities	2,01	2,07	2,24	1,73	1,70	2,56	2,55	3,14	2,34	2,89
Construction	4,85	5,00	4,62	4,92	3,39	9,50	8,99	7,90	6,94	7,86
Trade, restaurants and hotels	19,18	19,61	17,61	17,49	14,40	16,11	16,13	17,47	18,55	18,13
Transport, storage and communication	6,70	6,48	5,75	5,82	4,84	8,40	8,13	8,78	9,20	8,86
Finance, insurance, real estate and business services	19,32	20,27	27,67	32,15	39,17	2,51	3,08	4,32	7,02	9,37
Government services	16,15	18,99	19,50	17,76	19,26	17,61	20,67	23,23	23,41	26,24
Community, social and personal services	2,15	2,73	3,54	3,81	3,52	3,94	3,71	4,48	5,06	5,53

Note: For some countries the dataset do not go as far back as to the 1960s. For the missing values, we take the share from the closest year for which the data is available. BWA, 1964; ETH,1961; BRA, 1990; HKG, 1970, MYS,1970; PHL, 1971; SGP, 1970; IDN, 1966; MOR, 1970; In Europe the time series start in 1970 all countries except Great Britain.) West Germany and Peru are excluded due to the data availability problems. All the shares for each region are calculated by taking unweighted averages across the countries.
Source: GGDC database. Our calculations.

Table A.2 : Employment share of sectors, by regions, 1960-2010, %.

	Sub-Saharan Africa					Latin America					Asia					Middle East and North Africa				
	1960	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**
Agriculture	72,97	65,67	59,63	56,58	49,68	49,68	33,90	25,14	19,11	14,40	48,65	43,26	31,63	25,47	21,06	59,29	47,73	36,52	32,08	26,22
Mining	1,66	1,48	1,54	0,98	0,93	0,93	1,36	1,30	1,00	1,34	0,85	0,67	0,51	0,35	0,38	0,91	0,84	0,65	0,37	0,22
Manufacturing	5,08	6,91	8,30	8,26	8,40	8,40	15,46	15,33	13,24	11,66	14,60	17,83	19,00	16,66	14,99	9,35	13,40	14,36	13,77	12,19
Utilities	0,33	0,54	0,53	0,37	0,38	0,38	0,75	0,71	0,65	0,70	0,42	0,48	0,50	0,47	0,46	0,43	0,54	0,75	0,68	0,90
Construction	2,85	3,28	3,40	3,35	3,69	3,69	6,58	6,21	6,73	7,85	3,37	4,08	6,00	7,42	7,61	2,30	6,71	8,06	9,57	12,08
Trade, restaurants and hotels	6,29	7,44	10,69	12,71	16,64	16,64	12,57	17,19	21,85	23,59	12,81	13,94	17,63	19,99	21,61	8,86	9,62	11,54	14,92	15,77
Transport, storage and communication	2,07	2,46	2,46	2,63	3,34	3,34	4,71	5,05	6,11	6,96	4,38	4,39	5,45	6,26	6,59	3,24	3,32	4,64	4,88	6,73
Finance, insurance, real estate and business services	0,53	0,82	1,51	2,11	3,42	3,42	3,89	4,72	7,07	8,99	2,84	2,77	4,74	6,87	9,06	0,68	0,87	1,86	2,23	2,81
Government services	3,41	4,87	6,19	7,34	8,08	8,08	5,80	6,95	7,05	7,48	6,20	6,83	7,61	7,86	9,22	14,94	16,99	21,62	21,51	23,07
Community, social and personal services	4,81	6,53	5,76	5,67	5,44	5,44	14,98	17,39	17,20	17,03	5,86	5,76	6,94	8,65	9,03	incl in gov. services	incl in gov. services	incl in gov. services	incl in gov. services	incl in gov. Services

Table A.2 (continued): Employment share of sectors, by regions, 1960-2010, %.

	Europe					North America				
	1960	**1975**	**1990**	**2000**	**2010**	**1960**	**1975**	**1990**	**2000**	**2010**
Agriculture	20,14	10,07	5,68	3,90	3,09	5,70	3,12	2,03	1,59	1,46
Mining	1,53	0,68	0,35	0,19	0,17	1,03	0,83	0,59	0,39	0,50
Manufacturing	26,13	25,36	20,09	17,17	13,06	23,57	19,81	15,16	12,71	8,67
Utilities	0,69	0,73	0,71	0,58	0,55	0,73	0,67	0,58	0,41	0,38
Construction	8,24	8,80	7,49	7,00	7,25	5,46	5,21	5,60	5,79	5,05
Trade, restaurants and hotels	15,11	16,95	18,45	19,24	19,66	20,70	22,19	24,09	23,74	24,01
Transport, storage and communication	6,77	6,81	6,93	6,97	6,68	6,58	5,75	4,77	4,85	4,44
Finance, insurance, real estate and business services	3,46	5,43	9,14	12,39	14,37	8,28	10,24	15,45	18,24	18,04
Government services	13,56	20,38	25,24	25,85	27,48	23,21	26,36	25,90	26,15	30,98
Community, social and personal services	4,39	4,78	5,91	6,72	7,69	4,75	5,82	5,84	6,15	6,47

Note: For some countries the dataset do not go as far back as to the 1960s. For the missing values, we take the share from the closest year for which the data is available. (BWA: 1964, ETH: 1961, KEN:1969, MWI:1966, MUS: 1962, SEN:1970, ZMB:1965, HKG: 1974, IDN:1961, KOR: 1963, MYS: 1975, PHL:1971, SGP:1970, TWN:1963.) All the shares for each region are calculated by taking unweighted averages across the countries.
Source: GGDC database. Our calculations.

Table A.3.a : Difference in average annual growth rate: Manufacturing vs GDP, by regions, 1970-2018, %.

Region/Subregion	1970-80	1980-90	1990-2000	2000-10	2010-18
Eastern Asia	-0.05	-0.41	-2.30	7.91	0.34
Eastern Europe	0.63	-0.88	-0.69	0.47	0.44
Latin America and the Caribbean	0.26	-0.32	-0.35	-1.18	-0.84
Northern Africa	-0.34	3.55	1.11	-0.34	0.62
Northern America	-1.40	-0.77	0.62	-0.61	-0.64
Northern Europe	-0.90	-0.81	-0.60	-1.54	0.28
Sub-Saharan Africa	1.76	-1.74	-2.68	-2.85	0.52
Western Asia	-1.69	4.41	0.14	0.34	0.44
Western Europe	-0.84	-0.60	-0.75	-0.09	0.49

Table A.3.b : Difference in average annual growth rate: Agriculture, hunting, forestry, fishing vs GDP, by regions, 1970-2018, %.

Region/Subregion	1970-80	1980-90	1990-2000	2000-10	2010-18
Eastern Asia	-3.60	-0.95	-1.45	-2.29	-1.21
Eastern Europe	0.81	-3.05	-0.67	-3.19	0.55
Latin America and the Caribbean	-2.70	0.53	-0.66	-0.28	0.23
Northern Africa	-3.85	0.50	0.51	-0.23	2.32
Northern America	-3.08	0.92	-0.40	-0.06	0.03
Northern Europe	-0.79	1.82	-4.38	-0.87	-0.74
Sub-Saharan Africa	-1.92	1.07	0.41	0.07	0.20
Western Asia	-4.67	2.02	-2.18	-2.33	-2.17
Western Europe	-0.96	-0.12	-2.36	-0.46	-1.22

Table A.3.c : Difference in average annual growth rate: Wholesale, retail trade, restaurants and hotels vs GDP, by regions, 1970-2018, %.

Region/Subregion	1970-80	1980-90	1990-2000	2000-10	2010-18
Eastern Asia	3.17	0.15	-0.21	-1.15	-0.07
Eastern Europe	-0.14	-2.33	3.11	1.84	-0.04
Latin America and the Caribbean	-0.45	-0.33	-0.27	0.12	0.03
Northern Africa	1.56	2.56	0.86	-0.90	2.22
Northern America	-0.01	1.38	1.33	-0.63	0.10
Northern Europe	-0.84	0.25	0.18	0.11	0.66
Sub-Saharan Africa	-0.12	0.69	-0.10	1.83	0.13
Western Asia	1.49	2.04	0.44	1.94	0.46
Western Europe	-0.12	0.28	0.03	0.00	0.34

Table A.3.d : Difference in average annual growth rate: Transport, storage and communication vs GDP, by regions, 1970-2018, %.

Region/Subregion	1970-80	1980-90	1990-2000	2000-10	2010-18
Eastern Asia	-1.97	-0.40	0.71	-1.40	-0.98
Eastern Europe	1.90	-1.91	-0.93	-0.20	1.39
Latin America and the Caribbean	2.12	0.85	1.02	1.22	1.36
Northern Africa	3.87	2.54	0.46	3.30	1.88
Northern America	0.80	0.70	1.09	1.78	2.04
Northern Europe	-0.32	0.80	2.29	0.81	0.93
Sub-Saharan Africa	0.85	-0.28	1.80	5.32	0.90
Western Asia	1.72	2.76	1.15	1.73	1.14
Western Europe	-0.05	0.93	1.66	1.54	0.56

Table A.3.e : Difference in average annual growth rate: Other Activities vs GDP, by regions, 1970-2018, %.

Region/Subregion	1970-80	1980-90	1990-2000	2000-10	2010-18
Eastern Asia	1.59	-0.41	0.04	-0.22	0.29
Eastern Europe	-1.23	1.66	1.63	-0.79	-0.15
Latin America and the Caribbean	0.61	1.00	-0.23	0.09	0.56
Northern Africa	2.14	2.61	0.17	0.15	1.50
Northern America	0.04	-0.48	-0.93	0.05	-0.41
Northern Europe	0.53	0.03	0.11	0.55	-0.24
Sub-Saharan Africa	0.89	1.57	0.36	-0.42	-0.11
Western Asia	-0.07	1.87	-0.60	0.90	0.08
Western Europe	0.94	0.36	0.33	-0.04	-0.17

Notes: We first computed the growth factors for each year based on 2015 constant prices and then took the unweighted geometric mean of growth factors for each time period to calculate average annual sectoral growth rate. Then we subtracted the GDP growth rate from the sectoral growth rate.

Source: United Nations, Department of Economic and Social Affairs, The National Accounts Main Aggregates Database. Our calculation

Table A.4 : The excess growth of manufacturing or services over GDP growth across selected developing countries, 1960-2019, %.

	Mfg vs GDP				Services vs GDP			
	1960-75	**1975-90**	**1990-2005**	**2005-19**	**1960-75**	**1975-90**	**1990-2005**	**2005-19**
Argentina	0.15	-1.50	-0.73	-1.30	0.11	1.00	-0.13	0.59
Bolivia	1.15	-0.64	-0.19	0.08	0.41	0.70	0.09	0.29
Botswana	3.72	-3.12	-0.64	1.61	-	-	-1.74	-2.05
Brazil	-	-	-1.42	-2.13	0.71	8.58	3.06	6.02
Chile	-0.42	-0.26	-1.53	-1.57	0.45	-0.04	0.56	0.92
China	-	-	-	-	-	2.97	0.13	0.80
Colombia	1.36	-0.57	-1.20	-1.73	0.85	0.05	0.86	0.39
Ecuador	2.65	0.58	-0.20	-0.62	-0.57	0.87	-0.40	0.58
Egypt, Arab Rep.	-	-	-	-1.95	0.83	0.91	0.04	0.10
Ethiopia	-	0.72	-1.96	2.92	-	2.26	0.75	2.19
Gabon	-	0.84	12.59	1.00	-	-	-0.70	2.42
Gambia, The	1.91	2.39	-0.19	-3.00	-	-	-	3.66
Ghana	-	-	-	-2.38	1.14	1.97	-1.09	-2.31
India	0.97	0.97	0.25	0.62	2.77	2.82	-1.56	0.13
Indonesia	1.47	5.28	1.85	-1.07	-0.56	-0.16	3.30	2.32
Kenya	3.80	0.97	-0.62	-2.05	-	-	-	0.69
Malawi	-	0.31	-4.63	2.40	1.00	0.64	0.06	-2.31
Malaysia	4.56	3.62	1.83	-0.85	-	-2.15	-0.23	-0.03
Mauritius	-	3.13	-1.11	-2.11	5.61	-1.41	-1.62	1.71
Mexico	-0.09	-0.04	-0.01	-0.46	14.25	5.52	5.49	4.94
Nigeria	-	-5.56	-5.05	0.53	-	1.64	1.53	2.12
Pakistan	2.23	1.28	1.75	-0.04	0.97	-0.06	0.57	0.93
Peru	0.22	-0.69	0.03	-1.79	-	-	-0.79	0.92
Philippines	0.92	-0.71	-0.34	-1.28	-0.51	0.66	0.50	0.82

Table A.4 (continued) : The excess growth of manufacturing or services over GDP growth across selected developing countries, 1960-2019, %.

Senegal	-	-	-	-0.46	-	0.35	0.18	-0.21
South Africa	2.69	0.29	-0.59	-1.01	-	-	1.00	2.33
Sri Lanka	0.72	0.63	1.35	-1.41	2.70	0.37	-0.45	-0.71
Tanzania	-	-	0.22	1.45	-	-	0.02	-0.56
Thailand	3.80	1.96	0.08	-0.87	-0.08	-6.65	-2.95	0.57
Turkey	3.26	1.07	0.60	0.50	0.09	-1.70	-0.31	-1.98
Venezuela, RB	1.95	0.98	0.94	-4.13	-3.05	-1.26	2.27	4.62
Zambia	5.17	2.36	-0.33	-1.04	-2.39	-0.72	1.37	1.60

Source: World Bank, World Development Indicators database. Our calculations.

Appendix B : Panel VAR methodology

Here we outline the econometric methodology used in the section 5.2.4.5. We first show the estimation procedure of the panel vector autoregressive model by the Arellano-Bond GMM estimator. Then we set out the conditions for the stability of the panel VAR model. Last, we consider the model specification using the maximum-likelihood based model selection criteria (MMSC) developed by Andrews and Lu (2001).

B1 : Estimation

In the spirit of Sims (1980), we specify our reduced-form k-variate panel vector autoregressive (VAR) model of order p as follows:

$$Z_{it} = Z_{it-1}\boldsymbol{A_1} + Z_{it-2}\boldsymbol{A_2} + \cdots + Z_{it-p}\boldsymbol{A_p} + \mu_i + \varepsilon_{it}, , i \in \{1,2,\ldots,N\}, t = \{1,2,\ldots,T\} \quad (1)$$

where Z_{it} is a k-variate row vector of endogenous variables for country i at time t and $Z_{it} \in \mathbb{R}^k$, $\mathbf{A_j}$ is k by k autoregressive coefficients matrix and j ∈ {1,2,…,p}, μ_i is a k-dimensional row vector of equation-specific unobserved panel fixed effects and $\mu_i \in \mathbb{R}^k$, and ε_{it} is a k-dimensional row vector of idiosyncratic errors and $\varepsilon_{it} \in \mathbb{R}^k$.

We made the simplifying assumption that there exist no exogenous variables in the model so all the variables which are simply treated as endogenous are expressed as a linear function of their predetermined values up to p lags. While we assume no serial correlation in error terms within an equation, $E[\varepsilon_{it}^T \varepsilon_{is}] = 0 \; for \; t > s$, contemporaneous correlations among them are allowable, that is, $E[\varepsilon_{it}\varepsilon_{it}^T] = \boldsymbol{\Sigma}$. We also assume that the same data generating process produces all the cross-sectional units, so $\mathbf{A_j}$ is common across the panels while systematic heterogeneity inherent in cross-section dimension is accounted for by panel-specific country fixed effects, μ_i. Thus, we can apply traditional panel data methodology based on the assumption of homogenous slopes with heterogeneous intercepts.

However, estimating (1) is not as straightforward as it might seem at the first glance. We could use the within estimator or Least Squares Dummy Variable estimator or simple OLS after removing country fixed effect through some transformation but we know that the presence of lagged dependent variables on the right hand side might cause Nickell bias (1981). While we know that the within estimator yields consistent estimates as $T \longrightarrow \infty$, Judson and Owen (1999) prove that there exists a significant bias even when T = 30.

$$Z_{it} = \rho\, Z_{it-1} + \mu_i + \varepsilon_{it} \tag{1.a}$$

$$\bar{Z}_{i.} = \rho\, \bar{Z}_{i.} + \mu_i + \overline{\varepsilon_{i.}} \quad \text{where } \bar{Z}_{i.} = \frac{1}{T}\sum_{t=1}^{T} Z_{it} \text{ and } |\rho| < 1. \tag{1.b}$$

When we subtract (1.b) from (1.a) to get rid of panel fixed effects, μ_i, then we obtain

$$Z_{it} - \bar{Z}_{i.} = \rho(Z_{it-1} - \bar{Z}_{i.}) + (\varepsilon_{it} - \overline{\varepsilon_{i.}}) \tag{1.c}$$

If we try to estimate the transformed model (1.c) by applying the ordinary least squares estimator, the endogeneity bias, $cov\ [(Z_{it-1} - \bar{Z}_{i.}), (\varepsilon_{it} - \overline{\varepsilon_{i.}})] \neq 0$, prevents us from having consistent estimates, $\lim_{N\to\infty} \hat{\rho} \neq \rho$, because ε_{it} is not orthogonal to $\overline{Z_{i.}}$ and ε_{it-1} is common to both Z_{it-1} and $\overline{\varepsilon_{i}}$.

Anderson and Hsiao (1982) suggest using first-difference transformation to purge the panel fixed effects of the model. After first differencing (1.a), we get

$$Z_{it} - Z_{it-1} = (\rho\, Z_{it-1} + \mu_i + \varepsilon_{it}) - (\rho\, Z_{it-2} + \mu_i + \varepsilon_{it-1}) \Rightarrow \Delta Z_{it} = \rho \Delta\, Z_{it-1} + \Delta\varepsilon_{it} \tag{1.d}$$

where Δ is the first-difference operator.

But, again, the fact that $cov[\Delta\, Z_{it-1}, \Delta\varepsilon_{it}] \neq 0$ since Z_{it-1} is a function of ε_{it-1} by construction makes us to use the lagged values of Z_{it} as instruments for ΔZ_{it-1} to overcome the endogeneity problem inherent in first difference transformation within the dynamic panel context. We usually start with using the second lag of the dependent variable as instrument because $cov[\Delta\, Z_{it-1}, Z_{it-2}] \neq 0$ and $cov[Z_{it-2}, \Delta\varepsilon_{it}] = 0$. But Z_{it-2} becomes a valid instrument if and only if $\varepsilon_{it} \sim iid\ (0, \sigma^2\mathbf{I})$. In the presence of serial correlation in idiosyncratic error terms, Z_{it-2} also ceases to be a valid instrument.

$$\varepsilon_{it} - \varepsilon_{it-1} = (\alpha\varepsilon_{it-1} + u_{it}) - (\alpha\varepsilon_{it-2} + u_{it-1}) \Longrightarrow \Delta\varepsilon_{it} = \alpha\Delta\varepsilon_{it-1} + \Delta u_{it} \tag{1.e}$$

where $|\alpha| < 1$ and $u_{it} \sim iid\ (0, \sigma^2\mathbf{I})$.

Then, it is straightforward to establish from (1.e) that $cov[\, Z_{it-2}, \alpha(\varepsilon_{it-1} - \varepsilon_{it-2}) + \Delta u_{it}\,] \neq 0$ because Z_{it-2} is a function of ε_{it-2}. In this case, one must add the lagged values of dependent variable in level to the instrument matrix from the third lag on.

We must caution here that although the efficiency of the estimator increases with a large set of instruments derived from lagged values, we may run into the overfitting problem in the limit that the instruments get too weak to remedy the endogeneity bias as their number approaches the time dimension of the panels. A simple rule of thumb might be that the number of instruments should not exceed the cross-section dimension (Roodman, 2009). Another issue which weakens the instruments is the autoregressive coefficient being near unit root in the case of univariate dynamic panel models. In the case of instruments getting weakened by a dependent variable close to random walk process, Blundell and Bond (1998) develop the system GMM approach to exploit new moment conditions. They propose to use lagged differences of the dependent variables as instruments for the level equation while retaining the original Arellano-Bond instruments for the first-difference equation and estimate both equations simultaneously. After the first-difference transformation we would be left with only idiosyncratic disturbance term in the case of a unit root process. Then the moment conditions become totally irrelevant since the lagged values of dependent variable would carry no information about the endogenous regressor (Abrigo and Love 2016). Hence, we have to make sure that the series is stationary.

Even when we could obtain consistent estimates of the panel VAR model parameters by applying the panel GMM estimator one equation at a time, Holtz-Eakin, et.al. (1988) show that multi-equation GMM would prove to be both efficient and consistent estimator. If we left multiply the model (1) by the instrument matrix $\mathbf{X_{it}}$ which includes from the second up to qth lag of the dependent variables in levels after the first-difference transformation, we obtain

$$\mathbf{X_{it}^T}\Delta Z_{it} = \mathbf{X_{it}^T}\,\widetilde{\boldsymbol{Z_{it}}}\mathbf{A} + \mathbf{X_{it}^T}\Delta\varepsilon_{it} \qquad (2)$$

where

$$\Delta Z_{it} = \begin{bmatrix}\Delta z_{it}^1 & \dots & \Delta z_{it}^k\end{bmatrix}, \widetilde{\boldsymbol{Z_{it}}} = \begin{bmatrix}\Delta Z_{it-1} & \dots & \Delta Z_{it-p}\end{bmatrix}, \boldsymbol{X_{it}} = \begin{bmatrix}Z_{it-2} & \dots & Z_{it-q+}\end{bmatrix},$$

$$\mathbf{A^T} = \begin{bmatrix}\mathbf{A^T}_{\mathbf{1}} & \dots & \mathbf{A^T}_{\mathbf{p}}\end{bmatrix} \text{ and T denotes the transpose.}$$

The population moment conditions can be written as $E\left[\mathrm{X_{it}^T}\Delta\varepsilon_{it}\right] = E\left[\mathrm{X_{it}^T}\left(\Delta Z_{it} - \tilde{Z}_{\mathbf{it}}\mathbf{A}\right)\right] = 0$. It means that we have q equations from the columns of the instrument matrix $\mathbf{X_{it}}$ and p unknowns from the coefficient matrix **A** per equation. Whenever q>p, the model is considered as overidentified so the q-dimensional dependent variable vector is practically outside the column space of q by p matrix of $\mathbf{X_{it}^T}\,\widetilde{\boldsymbol{Z_{it}}}$ whose rank is p at most.

We redefine the so-called collapsed instrument matrix stacked over t as follows:

$$\mathbf{X_i} = \begin{pmatrix} \mathbf{0} & \mathbf{0} & \cdots & \mathbf{0} \\ \boldsymbol{z_{i1}} & \mathbf{0} & & \\ \boldsymbol{z_{i2}} & \boldsymbol{z_{i1}} & & \\ \vdots & \vdots & & \\ \boldsymbol{z_{iT-2}} & \boldsymbol{z_{iT-3}} & \cdots & \boldsymbol{z_{iT-q+1}} \end{pmatrix}$$

After stacking over time-dimension, the population moment conditions become $E\left[\mathbf{X_i^T}\boldsymbol{\Delta\varepsilon_i}\right] = 0$ where $\Delta\varepsilon_i$ is (T-1) by k matrix of errors stacked over time and defined as $\Delta\varepsilon_i = \Delta Z_i - \sum_{\ell=1}^{p} \tilde{Z}_{i\ell}\,\mathbf{A}_{\boldsymbol{\ell}}$. $\mathbf{A}_{\boldsymbol{\ell}}$ is k by k parameter matrix for the lth lag of endogenous variables, and ΔZ_i and $\tilde{Z}_{i\ell}$ are (T-1) by k matrix as defined above. The corresponding sample moment conditions can be formulated as follows:

$$\hat{g}(\tilde{\delta}) = \frac{1}{N}\sum_{i=1}^{N} \hat{g}_i\left(\tilde{\delta}\right)$$

$$\hat{g}_i(\tilde{\delta}) = \left(\boldsymbol{X_i} \otimes \mathbf{I_{kxk}}\right)(\mathrm{vec}[\boldsymbol{\Delta\hat{\varepsilon}}_{\mathrm{i}}])$$

where $\otimes$ and vec denote the Kronoecker product and the vectorization of a matrix, respectively while $\boldsymbol{\Delta\hat{\varepsilon}}_{\mathrm{i}} = \Delta Z_i - \sum_{\ell=1}^{p} \tilde{Z}_{i\ell}\,\widetilde{\mathbf{A}_{\boldsymbol{\ell}}}$, $\widetilde{\boldsymbol{A}}$ contains the true population parameters evaluated at some hypothetical value $\tilde{\delta}$ of δ. While the population moment conditions hold theoretically, it would be practically impossible to satisfy sample moment conditions due to sampling error or noise in the data. Hence, our goal is to minimize this sampling error to obtain consistent estimator of the coefficient matrix **A**, a fact which makes Generalized Method of Moment an asymptotic or large sample estimator. We can characterize our objective function as follows:

$$\widehat{\boldsymbol{\delta_W}} = argmin_{\boldsymbol{A}} \left\|\frac{1}{N}\sum_{i=1}^{N} \hat{g}_i\left(\tilde{\delta}\right)\right\| \equiv N\,\left(\sum_{i=1}^{N} \hat{g}_i\left(\tilde{\delta}\right)\right)^T \boldsymbol{W}\left(\sum_{i=1}^{N} \hat{g}_i\left(\tilde{\delta}\right)\right) \quad (2.a)$$

where **W** is the symmetric and positive semidefinite weighting matrix, $\|.\|$ denotes the Euclidean norm.

We can clearly establish that the GMM estimator is also a linear function of the weighting matrix **W**. The first order conditions of the objective function in (2.a) yield the formula for the GMM estimator. After stacking first over cross-sectional dimension and then over time dimension, we have

$$\hat{A}_{GMM} = \left[\left(\mathbf{X}^{\mathrm{T}}\,\widetilde{\boldsymbol{Z}}\right)^{\boldsymbol{T}}\boldsymbol{W}\left(\mathbf{X}^{\mathrm{T}}\,\widetilde{\boldsymbol{Z}}\right)\right]^{-\mathbf{1}}\left(\mathbf{X}^{\mathrm{T}}\,\widetilde{\boldsymbol{Z}}\right)^{\boldsymbol{T}}\boldsymbol{W}\left(\mathbf{X}^{\mathbf{T}}\Delta Z\right) \tag{2.b}$$

Depending on the choice of the weighting matrix **W**, we could obtain consistent linear estimator of **A**. Now, the problem facing the researcher is reduced down to the optimal selection of the weighting matrix **W** which determines the efficiency of the estimator in (2.b). The lower bound for the asymptotic variance of the GMM estimator is achieved when the instruments are weighted in inverse proportion to their variance-covariance, $W = var\,[\mathbf{X}^{\mathbf{T}}\Delta\varepsilon]^{-1}$

The easiest proof is based on the Generalized Least Squares (GLS) methodology. We start with the transformed model in its compact form (2) and check out its covariance matrix for one-equation only.

$$\begin{aligned} var\left[\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta\varepsilon_{it}\right] = Avar\left[\frac{1}{N}\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta\varepsilon_{it}\right] &= \operatorname*{plim}_{N\to\infty} N\ var\left[\frac{1}{N}\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta\varepsilon_{it}\right] \\ &= \operatorname*{plim}_{N\to\infty} N\ E\left[\frac{1}{N^2}\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta\varepsilon_{it}\Delta\varepsilon_{it}^{T}\mathbf{X}_{\mathbf{it}}\right] \\ &= \operatorname*{plim}_{N\to\infty} N\ E\left[E(\frac{1}{N^2}\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta\varepsilon_{it}\Delta\varepsilon_{it}^{T}\mathbf{X}_{\mathbf{it}}\,\middle|\,\mathbf{X}_{\mathbf{it}}\right] \\ &= \operatorname*{plim}_{N\to\infty} \frac{1}{N}\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\ E\left[\Delta\varepsilon_{it}\Delta\varepsilon_{it}^{T}\,\middle|\mathbf{X}_{\mathbf{it}}\right]\mathbf{X}_{\mathbf{it}} = \ \mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\ \boldsymbol{\Omega}\mathbf{X}_{\mathbf{it}} \end{aligned} \tag{2'.c}$$

where Avar and plim denote the asymptotic variance and probability limit, respectively.

In the penultimate equation, we resort to the law of iterated expectations and then arrive at the last equation by the moment conditions. Let's define the covariance matrix of the error terms in the first difference model as $\boldsymbol{\Omega}_{\mathbf{i}} = E\left[\Delta\varepsilon_{it}\Delta\varepsilon_{it}^{T}\,\middle|\mathbf{X}_{\mathbf{it}}\right]$ $where\ i = (1,2,..,N)$. When we work out what is inside the covariance matrix $\boldsymbol{\Omega}$ of T-2 by T-2 for just one cross-sectional unit, we see that it is nothing but the well-known tridiagonal second-difference matrix multiplied by the scalar error variance σ_{ε}^{2}. On the main diagonal, we have $E[(\varepsilon_{it} - \varepsilon_{it-1})(\varepsilon_{it} - \varepsilon_{it-1})^{\mathrm{T}}\,|\mathbf{X}_{\mathbf{it}}] = E\left[\varepsilon_{it}^{2}\,\middle|\mathbf{X}_{\mathbf{it}}\right] +$

$E\left[\varepsilon_{it-}^2 \;\left|\mathbf{X_{it}}\right.\right] - 2E[\varepsilon_{it}\varepsilon_{it-1}|\mathbf{X_{it}}] = 2\sigma_\varepsilon^2$ since $\varepsilon_{it} \sim iid\,(0, \sigma^2\mathbf{I})$. Both above and below the main diagonal, we get $E[(\varepsilon_{it} - \varepsilon_{it-1})(\varepsilon_{it-1} - \varepsilon_{it-2})^{\mathrm{T}}\,|\mathbf{X_{it}}] = E[(\varepsilon_{it-1} - \varepsilon_{it-2})(\varepsilon_{it} - \varepsilon_{it-1})^{\mathrm{T}}\,|\mathbf{X_{it}}] = E\left[-\varepsilon_{it}^2\,\left|\mathbf{X_{it}}\right.\right] = -\sigma_\varepsilon^2$.

Hence, the covariance matrix $\mathbf{\Omega_i}$ which is both symmetric and positive definite can be factorized into $\mathbf{MM^T}$ where $\mathbf{M}$ is the first difference matrix:

$$\mathbf{\Omega_i} = \sigma_\varepsilon^2 \begin{pmatrix} \mathbf{2} & \mathbf{-1} & \mathbf{0} & \dots & \mathbf{0} \\ \mathbf{-1} & \mathbf{2} & \mathbf{-1} & & \vdots \\ \mathbf{0} & \mathbf{-1} & \mathbf{2} & \mathbf{-1} & \mathbf{0} \\ \vdots & & & \ddots & \mathbf{-1} \\ \mathbf{0} & \cdots & \mathbf{0} & \mathbf{-1} & \mathbf{1} \end{pmatrix}$$
$$= \begin{pmatrix} \mathbf{-1} & \mathbf{1} & \mathbf{0} & \dots & \mathbf{0} \\ \mathbf{0} & \mathbf{-1} & \mathbf{1} & & \vdots \\ \mathbf{0} & \mathbf{0} & \mathbf{-1} & \mathbf{1} & \mathbf{0} \\ \vdots & & & \ddots & \\ & & & \mathbf{-1} & \mathbf{1} \\ \mathbf{0} & \cdots & \mathbf{0} & & \mathbf{-1} \end{pmatrix} \begin{pmatrix} \mathbf{-1} & \mathbf{0} & \mathbf{0} & \dots & \mathbf{0} \\ \mathbf{1} & \mathbf{-1} & & & \vdots \\ \mathbf{0} & \mathbf{1} & \mathbf{-1} & \mathbf{0} & \mathbf{0} \\ \vdots & & & \ddots & \\ & & & \mathbf{-1} & \mathbf{0} \\ \mathbf{0} & \cdots & \mathbf{0} & \mathbf{1} & \mathbf{-1} \end{pmatrix}$$

Now that we know the structure of the nonspherical covariance matrix $\mathbf{\Omega_i} = \sigma^2_\varepsilon \mathbf{MM^T}$, we can further apply the GLS methodology because the direct estimation of the first difference model would not help us attain the Cramer-Rao lower bound. All we need to do is simply to transform the model (2) by pre-multiplying it by $\mathbf{M^{-1}}$ and diagonalize its covariance matrix.

$$\widetilde{u_{it}} = \boldsymbol{M}^{-1}\mathbf{X_{it}^T}\Delta\varepsilon_{it} \implies var[\boldsymbol{M}^{-1}\mathbf{X_{it}^T}\Delta\varepsilon_{it}|\mathbf{X_{it}}] = E\left[\boldsymbol{M}^{-1}\mathbf{X_{it}^T}\Delta\varepsilon_{it}\Delta\varepsilon_{it}^T\mathbf{X_{it}}\left(\boldsymbol{M}^{-1}\right)^{\boldsymbol{T}}|\mathbf{X_{it}}\right]$$
$$= \boldsymbol{M}^{-1}var[\mathbf{X_{it}^T}\Delta\varepsilon_{it}|\mathbf{X_{it}}]\left(\boldsymbol{M^T}\right)^{-1} = \sigma_\varepsilon^2\boldsymbol{M}^{-1}\boldsymbol{\Omega_i}(\boldsymbol{M^T})^{-1}$$
$$= \boldsymbol{M}^{-1}\boldsymbol{MM^T}(\boldsymbol{M^T})^{-1} = \sigma_\varepsilon^2\,\boldsymbol{I}$$

After the transformation, the Gauss-Markov theorem applies to the estimator.

When we apply this diagonalization to all panels, we have

$$\widetilde{\mathbf{\Omega}} = I_N \otimes var[\boldsymbol{M}^{-1}\mathbf{X_{it}^T}\Delta\varepsilon_{it}|\mathbf{X_{it}}]$$

$$\text{where } \widetilde{\mathbf{\Omega}} = \begin{pmatrix} \mathbf{\Omega_1} & & \\ & \ddots & \\ & & \mathbf{\Omega_N} \end{pmatrix}.$$

Hence, we prove that the efficient GMM estimator should choose the inverse of covariance matrix of the transformed model as the optimal weighting matrix.

However, in practice, $var\left[\mathbf{X_{it}^T}\Delta\varepsilon_{it}\right]^{-1}$ or equivalently $\left(\mathbf{X_{it}^T}\,\mathbf{\Omega}\mathbf{X_{it}}\right)^{-1}$ is unknown. To get a feasible estimator, we should first obtain the residuals from any consistent estimator in the initial stage of the estimation procedure for (2.b). Since the choice of the weighting matrix does not affect the consistency of $\hat{A}_{GMM}$, then any full-rank matrix does the trick. We would like to keep it simple by choosing the identity matrix at the first step to get the so-called sandwich estimator $\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widehat{\boldsymbol{\Omega}}\mathbf{X}_{\mathbf{it}}\right)^{-\mathbf{1}}$. Then, at the second stage, we just set the weighting matrix as equal to the inverse of the covariance matrix obtained from the instrumental variable estimator or 2-Stages Least Squares estimator from the first-step (Hayashi 2000). When we plug $\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widehat{\boldsymbol{\Omega}}\mathbf{X}_{\mathbf{it}}\right)^{-\mathbf{1}}$into (2b), we have

$$\hat{A}_{FGMM} = \left[\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widetilde{\boldsymbol{Z}_{\iota t}}\right)^{\boldsymbol{T}}\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widehat{\boldsymbol{\Omega}}\mathbf{X}_{\mathbf{it}}\right)^{-\mathbf{1}}\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widetilde{\boldsymbol{Z}_{\iota t}}\right)\right]^{-\mathbf{1}}\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widetilde{\boldsymbol{Z}_{\iota t}}\right)^{\boldsymbol{T}}\left(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\,\widehat{\boldsymbol{\Omega}}\mathbf{X}_{\mathbf{it}}\right)^{-\mathbf{1}}(\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta Z_{it}) \quad (2.d)$$

The feasible GMM estimator has the lowest asymptotic variance and standard errors robust to heteroscedasticity and autocorrelation within panels.

We could enhance the efficiency of the estimator in (2.c) by increasing the moment conditions. It means adding longer lags as instrumental variables for the first-difference equation within the GMM framework. Even before differencing, the autoregressive order of the panel VAR model costs us p observations per panel. To keep the discussion simple, we assume that p=1. After the first-differencing, we lose one more observation per panel to the transformation itself. When we include older lags in the columns of the instrument matrix, the model becomes overidentified but we would be losing as many observations per each cross-sectional unit as the number of extra columns of the instruments matrix.

Let us go back to the model (1.d). When $\Delta\, Z_{it-1}$is instrumented with $Z_{it-2}$and Z_{it-3}, then q=2 and p=1 so the model becomes overidentified where we have one endogenous regressor and two moment conditions. But then, it would require at least 4 time periods per panel due to the missing values.

$$\boldsymbol{X}_{\boldsymbol{it}} = \begin{pmatrix} . & . \\ Z_{i1} & . \\ Z_{i2} & Z_{i1} \\ \vdots & \vdots \\ Z_{iT-2} & Z_{iT-3} \end{pmatrix}$$

As we add one more column to the instrument matrix with the inclusion of the fourth lag, we would lose one more observation per panel so we could start calculations at time t=5. To avoid this additional loss of degrees of freedom, Holtz-Eakin et.al. (1988) suggest to replace missing values (dots) with zeros by noting that the moment conditions still hold, $E\left[\mathbf{X}_{\mathbf{it}}^{\mathbf{T}}\Delta\varepsilon_{it}\right]=0$. Stata's *gmmstyle* command simply executes the Holtz-Eakin et.al.'s suggestion.

$$E\begin{pmatrix} 0 & Z_{i1} & Z_{i2} & \dots & Z_{iT-2} \\ 0 & 0 & Z_{i1} & \dots & Z_{iT-3} \end{pmatrix}\begin{bmatrix} 0 \\ \Delta\varepsilon_{i3} \\ \Delta\varepsilon_{i4} \\ \vdots \\ \Delta T \end{bmatrix}=\begin{bmatrix} 0 & 0 \\ \vdots & \vdots \\ 0 & 0 \end{bmatrix}$$

B2 : The Stability of the Panel VAR Model

Even though we could consistently estimate the Panel VAR model coefficients by the estimator in (2.c), it is hard to interpret them directly since we have just put the lags of dependent variables on the right hand side of each equation. However, if we guarantee that the panel VAR model of order p satisfies the stability conditions, then we could make causal inferences after converting the model into an-infinite order vector moving average (VMA) process.

We could more compactly write a panel VAR model of any order p as a first-order panel VAR model by means of the companion matrix.

$$\check{Z}_{it}=\begin{pmatrix} Z_{it} \\ Z_{it-1} \\ \vdots \\ Z_{it-p+1} \end{pmatrix}=\begin{pmatrix} \mu_i \\ 0 \\ \vdots \\ 0 \end{pmatrix}+\begin{pmatrix} \boldsymbol{A_1} & \boldsymbol{A_2} & & \boldsymbol{A_p} \\ \boldsymbol{I_k} & & & \\ & \ddots & & \\ & & \boldsymbol{I_K} & \boldsymbol{0} \end{pmatrix}\begin{pmatrix} Z_{it-1} \\ Z_{it-2} \\ \vdots \\ Z_{it-p} \end{pmatrix}+\begin{pmatrix} \varepsilon_{it} \\ 0 \\ \vdots \\ 0 \end{pmatrix}$$

$$=\check{\mu}_i+\breve{\boldsymbol{A}}\,\check{Z}_{it-1}+\check{\epsilon}_{it} \qquad (3)$$

The companion matrix $\breve{\boldsymbol{A}}$ has kp by kp dimension and the stability condition of the panel VAR (p) model depends on all of its kp eigenvalues having the moduli inside the unit circle.

$$\mathit{Stability\ condition}\colon \left|\breve{\boldsymbol{A}}-\lambda\boldsymbol{I_{kp}}\right|=0\ \mathit{where}\ |\lambda_i|<1,\forall i,i=1,2,\dots,kp \qquad (3.a)$$

To see what would follow after the stability condition for the panel VAR model in (3.a) is satisfied, we show that the model can be reexpressed as a VMA (∞) by recursive substitution.

$$\check{Z}_{it}=\check{\mu}_i+\breve{\boldsymbol{A}}\left(\check{\mu}_i+\breve{\boldsymbol{A}}\,\check{Z}_{it-2}+\check{\epsilon}_{it-1}\right)+\check{\epsilon}_{it}=\left(\boldsymbol{I_k}+\breve{\boldsymbol{A}}\right)\check{\mu}_i+\breve{\boldsymbol{A}}^{\mathbf{2}}\check{Z}_{it-2}+\breve{\boldsymbol{A}}\check{\epsilon}_{it-1}+\check{\epsilon}_{it}$$

$$=\left(\boldsymbol{I_k}+\breve{\boldsymbol{A}}\right)\check{\mu}_i+\breve{\boldsymbol{A}}^{\mathbf{2}}\left(\check{\mu}_i+\breve{\boldsymbol{A}}\,\check{Z}_{it-3}+\check{\epsilon}_{it-2}\right)+\breve{\boldsymbol{A}}\check{\epsilon}_{it-1}+\check{\epsilon}_{it}$$

$$=\left(\boldsymbol{I_k}+\breve{\boldsymbol{A}}+\breve{\boldsymbol{A}}^{\mathbf{2}}\right)\check{\mu}_i+\breve{\boldsymbol{A}}^{\mathbf{3}}\check{Z}_{it-3}+\breve{\boldsymbol{A}}^{\mathbf{2}}\check{Z}_{it-2}+\breve{\boldsymbol{A}}\check{\epsilon}_{it-1}+\check{\epsilon}_{it}=\cdots=$$

$$= \left(\boldsymbol{I_k} + \sum_{j=1}^{t-1} \boldsymbol{\breve{A}^j}\right)\breve{\mu}_i + \boldsymbol{\breve{A}^t}\breve{Z}_{i0} + \sum_{j=1}^{t-1} \boldsymbol{\breve{A}^j}\breve{\epsilon}_{it-j} + \breve{\epsilon}_{it} \qquad (3.b)$$

When we take the conditional expectation of the VMA (∞) in (3.b) as the limit goes to t→∞, we have

$$E\left[\breve{Z}_{it}|Z_{i0}\right] = \left(\boldsymbol{I_k} + \sum_{j=1}^{t-1} \boldsymbol{\breve{A}^j}\right)\breve{\mu}_i + \boldsymbol{\breve{A}^t}\breve{Z}_{i0} \text{ since } E[\breve{\epsilon}_{it}|Z_{i0}] = 0 \text{ by assumption (3.c)}$$

where $\breve{Z}_{i0}$ represents the initial value of the vector process $\breve{Z}_{it}$.

Now it becomes clear that the statistical properties of the panel VAR model depend on the matrix powers $\boldsymbol{\breve{A}^t}$. We can check out the stability of the panel VAR model by the spectral decomposition of the companion matrix where $\boldsymbol{\breve{A}^t} = \boldsymbol{S\Lambda^t S^{-1}}$. **S** is the eigenvector matrix, and **Λ** is the diagonal matrix with the eigenvalues being on the main diagonal. The matrix powers are convergent when $\lim_{t\to\infty} \boldsymbol{\breve{A}^t} = 0$ since $\boldsymbol{\Lambda^t} \longrightarrow$ $\boldsymbol{zero\ matrix\ by}$ $(\boldsymbol{3.a})$. As a result,

$$\lim_{t\to\infty} E\left[\breve{Z}_{it}|Z_{i0}\right] = \left(\boldsymbol{I_k} - \boldsymbol{\breve{A}}\right)\breve{\mu}_i \qquad (3.d)$$

since $\left(\boldsymbol{I_k} + \sum_{j=1}^{t-1} \boldsymbol{\breve{A}^j}\right) = \left(\boldsymbol{I_k} - \boldsymbol{\breve{A}}\right)$ when there exists $t \in \mathbb{N}$ $such\ that\ \boldsymbol{\breve{A}^t} = \boldsymbol{0}$.

The expected value of the vector process $\breve{Z}_{it}$ when t→ ∞ is equal to a vector of scalars. We can similarly extend these arguments into the covariance matrix of the vector process $\breve{Z}_{it}$. Hence the covariance-stationarity of the vector process $\breve{Z}_{it}$ is equivalent to all the moduli of eigenvalues of the companion matrix $\boldsymbol{\breve{A}}$ being strictly less than one.

With the transformation of the panel VAR model into the VMA (∞), we could obtain the impulse-response functions. However, the contemporaneous correlations among the idiosyncratic terms as captured by $E[\varepsilon_{it}\varepsilon_{it}^T] = \boldsymbol{\Sigma}$ prevents us from identifying shocks to each equation in the system. By construction, one shock to any equation is likely to have repercussions on other in the system. While being uncorrelated over time, the shocks might be correlated at a given point in time across the equations.

$$\boldsymbol{\Sigma} = E[\varepsilon_{it}\varepsilon_{it}^T|\mathcal{I}_{t-1}] = E\left[\begin{pmatrix}\varepsilon_{it}^1\\ \vdots\\ \varepsilon_{it}^k\end{pmatrix}\begin{pmatrix}\varepsilon_{it}^1 & \dots & \varepsilon_{it}^k\end{pmatrix}|\mathcal{I}_{t-1}\right] = \begin{pmatrix}\Sigma_{11} & \Sigma_{12} & \dots & \Sigma_{1k}\\ \Sigma_{21} & \Sigma_{22} & \dots & \Sigma_{2k}\\ \vdots & & & \vdots\\ \Sigma_{k1} & \dots & & \Sigma_{kk}\end{pmatrix}$$

where $\mathcal{I}_{t-1}$ is the information set at time t-1, $\mathcal{I}_{t-1} = \{Z_{it-1}, \dots, Z_{it-p}\}$.

Σ is k by k symmetric and positive definite matrix. It is symmetric because $\Sigma_{\text{js}} = \text{cov}\left(\varepsilon_{it}^{j}, \varepsilon_{it}^{j}\right) = \text{cov}\left(\varepsilon_{it}^{s}, \varepsilon_{it}^{j}\right) = \Sigma_{\text{js}}\ for\ j \neq s$. It is positive definite because the energy test yields $x^T(\varepsilon\varepsilon^T)x = (x^T\varepsilon)(\varepsilon^T x) = (\varepsilon^T x)^T(\varepsilon^T x) = \|\varepsilon^T x\|^2 > 0\ when\ x \neq 0$ (we just dropped the subscripts for convenience). The fact that **Σ** is symmetric and positive definite allows us to separate shocks through the Cholesky decomposition (Sims 1980) where $\boldsymbol{\Sigma} = \boldsymbol{PP^T}$**.** Here, **P** is the lower triangular Cholesky factor. We should in passing note that this factorization is not unique. For example, we could have applied the Singular Value Decomposition as well. If we pre-multiply the shocks by the Cholesky factor inverse, we could obtain a diagonal covariance matrix so that the shocks and their repercussions can be isolated from each other.

$$\ddot{\varepsilon}_{it} = \boldsymbol{P^{-1}}\varepsilon_{it} \Longrightarrow E[\ddot{\varepsilon}_{it}\ddot{\varepsilon}^T{}_{it}|\mathcal{I}_{t-1}] = \boldsymbol{P^{-1}}E[\varepsilon_{it}\varepsilon_{it}^T|\mathcal{I}_{t-1}](\boldsymbol{P^{-1}})^{\boldsymbol{T}} = \boldsymbol{P^{-1}\Sigma}(\boldsymbol{P^T})^{-\boldsymbol{1}}$$
$$= \boldsymbol{P^{-1}PP^T}(\boldsymbol{P^T})^{-\boldsymbol{1}} = \boldsymbol{I} \tag{3.e}$$

With the diagonalized covariance matrix, we could work with the orthogonalized impulse-response functions using the structural form. However, we should be aware that the order in which the dependent variables enter into the vector process Z_{it} reflects the identifying restrictions we impose on the error covariance matrix so as to make some causal inferences. For space consideration, let's examine the first order panel VAR model in its structural form.

$$\begin{pmatrix} 1 & & & & \\ -\beta_{21} & 1 & & & \\ -\beta_{31} & -\beta_{32} & 1 & & \\ & & & \ddots & \\ -\beta_{k1} & -\beta_{k2} & \cdots & & 1 \end{pmatrix}\begin{pmatrix} Z_{it}^1 \\ \vdots \\ Z_{it}^T \end{pmatrix} = \begin{pmatrix} \Pi_{11} & \Pi_{12} & \cdots & \Pi_{1k} \\ \Pi_{21} & \Pi_{22} & \cdots & \Pi_{2k} \\ \vdots & \vdots & \cdots & \vdots \\ \Pi_{k1} & \Pi_{k2} & \cdots & \Pi_{kk} \end{pmatrix}\begin{pmatrix} Z_{it-1}^1 \\ \vdots \\ Z_{it-1}^T \end{pmatrix} + \begin{pmatrix} \dddot{\varepsilon}^1{}_{it} \\ \vdots \\ \dddot{\varepsilon}^k{}_{it} \end{pmatrix} \tag{3.f}$$

The first two equations will suffice to shed light on the interpretation of the orthogonalized impulse-response functions.

$$Z_{it}^1 = \Pi_{11}Z_{it-1}^1 + \cdots + \Pi_{1k}Z_{it-1}^T + \dddot{\varepsilon}^1{}_{it}$$
$$Z_{it}^2 = \beta_{21}Z_{it}^1 + \Pi_{21}Z_{it-1}^1 + \cdots + \Pi_{2k}Z_{it-1}^T + \dddot{\varepsilon}^2{}_{it}$$

The first equation is the usual panel VAR model where its shock $\dddot{\varepsilon}^1{}_{it}$will have a direct impact on $Z_{it}^1$and other variables in the system. The second equation however, is the Autoregressive Distributed Lag (ARDL) model into which Z_{it}^1 enters as an explanatory variable for Z_{it}^2. The third equation is also another ARDL model for $Z_{it}^3$where both Z_{it}^1 and Z_{it}^2 now appear on the right hand side. The pattern applies to the rest of k-3 equations in the model. While the shocks on the first variable $\ddot{\varepsilon}^1{}_{it}$have contemporaneous effect on all the variables in the model, the shock on the second variable $\ddot{\varepsilon}^2{}_{it}$ will affect the first variable Z_{it}^1 with a time lag ($\ddot{\varepsilon}^2{}_{it} \longrightarrow Z_{it}^2 \longrightarrow Z_{it+1}^1$).

Since the orthogonalized impulse-response functions require a causal ordering, the Granger causality test might help us to arrange the vector process Z_{it} in addition to the economic theory on the subject. For a 2-variate panel VAR model of order p, the equations and the null hypothesis to be tested are as follows:

$$Z_{it}^1 = \sum_{j=1}^{p} \gamma_{1j} Z_{it-j}^1 + \sum_{j=1}^{p} \delta_{1j} Z_{it-j}^2 + \varepsilon_{it}^1 \Rightarrow H_0 \colon \delta_{1j} = 0, \forall j, j = 1,2, \dots, p.$$

"Z_{it}^2 does not Granger cause Z_{it}^1."

$$Z_{it}^2 = \sum_{j=1}^{p} \gamma_{2j} Z_{it-j}^1 + \sum_{j=1}^{p} \delta_{2j} Z_{it-j}^2 + \varepsilon_{it}^2 \Rightarrow H_0 \colon \gamma_{2j} = 0, \forall j, j = 1,2, \dots, p.$$

"Z_{it}^1 does not Granger-cause Z_{it}^2."

If one variable is the Granger-cause for other variable, and it is not the other way around according to the test results, we may place the former above the latter in the vector process Z_{it}.

B3 : Model Spescification and Optimal Lag Length in Moment Conditions

When we specify the panel VAR model, we need to decide both the optimal lag order while satisfying the moment conditions within the dynamic panel GMM framework. When it comes to the model specification, the inclusion of too many lags in the model might eat into an exponentially high degrees of freedom while a more parsimonious model which includes too few lags could easily be subject to the omitted variable bias. Regarding the moment conditions, the use of more moment conditions brings high efficiency to the GMM estimate while, on the other hand, adding too many moment conditions could lead to overfitting the endogenous variables so the Nickell bias could not be remedied by adding more instrumental variables. Andrews and Lu (2001) extends the standard GMM framework based on the Hansen's J statistics for overidentifying restrictions to the maximum-likelihood based model selection criteria (MMSC). The MMSC developed by Andrews and Lu (2001) contain "bonus terms" which reward the selection of fewer lag order for a fixed number of moment conditions and the inclusion of more lags of dependent variables in level as instruments for a given lag order of the panel VAR model.

Consider the model (2). The coefficient matrix **A** consists of p $\mathbf{A_i}$'s with each $\mathbf{A_i}$ having k x k parameters. The total number of parameters to be estimated comes out as k^2p because for each equation there are k different endogenous variables with each having p lags and we have k equations in the system. If each distinct endogenous variable with p lags each is instrumented with its q lags in level starting with the second lag, we would have q x k moment conditions per equation and k^2q moment conditions for the model as a whole. Whenever q>p, the Hansen's J statistics for overidentifying restrictions can be calculated since we have more equations than unknowns in the model.

$$MMSC_{BIC}(k,p,q) = J_n(k^2p, k^2q) - (|k^2q| - |k^2p|)\ln n$$

$$MMSC_{AIC}(k,p,q) = J_n(k^2p, k^2q) - 2(|k^2q| - |k^2p|)$$

$$MMSC_{HQIC}(k,p,q) = J_n(k^2p, k^2q) - Q(|k^2q| - |k^2p|)\ln\ln n \quad for\ Q > 2$$

where ln denotes the natural logarithm and n the sample size.

We would like to minimize $MMSC_{BIC}$, $MMSC_{AIC}$, $MMSC_{HQIC}$, and Hansen's J-statistics to specify optimal lag order while having the valid instruments for endogenous regressors. When the J statistics' probability value under the null hypothesis that the instruments are valid drops below 5 percent, we might suspect that the first-order autoregressive process might be present in the idiosyncratic error term which invalidates the moment conditions. In this case, we had better back off one period and start using the third lag of the dependent variable in level as instrument for the first-difference equation.

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DOKTORA TEZİNDEN TÜRETİLEN YAYINLAR, SUNUMLAR VE PATENTLER:

- **Çakır, M.S**., and Aydemir, R., 2022. The Effects of Supply Chain Disruptions, Inequality Shocks, and Institutional Innovations on the Pace of Industrialization in Developing Countries: A Panel VAR Analysis. *Eurasian Econometrics, Statistics & Empirical Economics Journal*, 21, 1-24.
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