

Impact of China's Slowdown on the Korean Economy



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The Bank of Korea

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- 1 Introduction to the Korean Economy and Its Exports
- 2 China's Slowdown and Structural Changes
- 3 Impacts of China's Structural Changes on Korean Economy
- 4 Other Considerations
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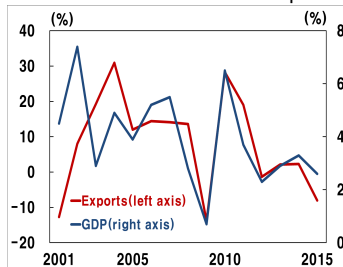
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Growth and Exports

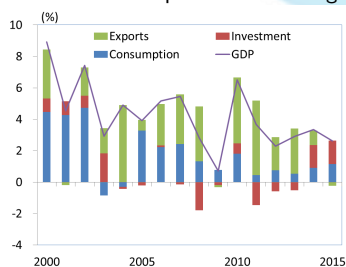
- Rates of Korean GDP and export growth both decreased since GFC
- Low export growth explains large part of drop in GDP growth

Growth rates of GDP and exports



Source: The Bank of Korea

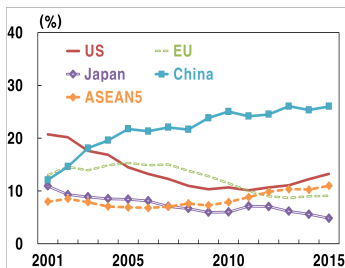
Contributions of components to GDP growth



Composition of Exports I

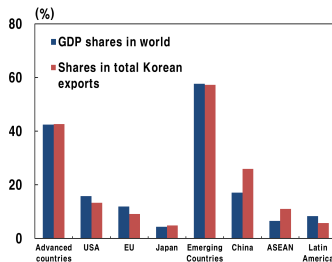
- Large portion of exports goes to East Asian economies
- However, overall regional destinations relatively well diversified

Regional destinations of exports



Source: IMF WEO database, the Bank of Korea

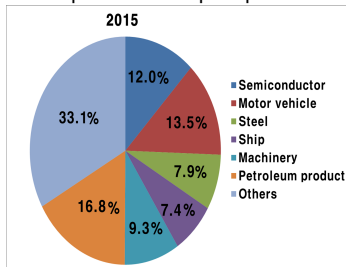
GDP shares and destination shares of Korean exports



Composition of Exports II

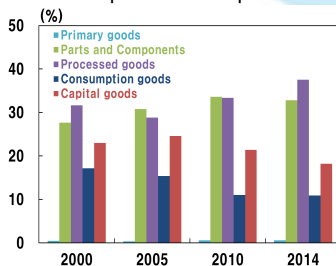
- Exports concentrated on relatively small number of products
 - Parts & components make up majority
 - Share of consumption goods quite small

Composition of export products



Source: WTO, BOK staff calculations

Components of exports



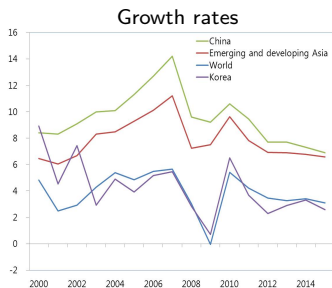
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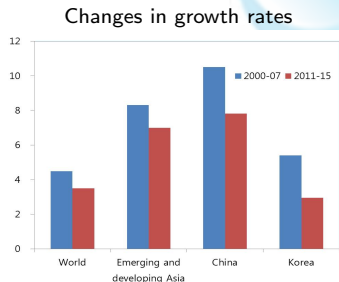


China's Growth Rate

- Since GFC, China's growth rate has slowed more than world average



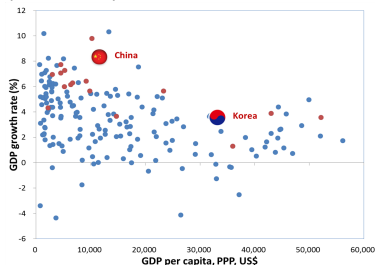
Source: IMF WEO database



Growth Convergence

- However, China's growth performance still prominent, even among its GDP per capita peer group
- Performance outstanding even compared with early 2000s' experiences of East Asian economies

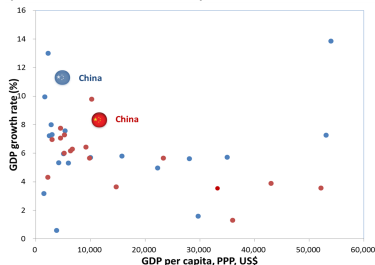
Country growth rates
(2010-2015)



Note: Red and blue dots represent Asian and other economies, respectively.

Source: IMF WEO database

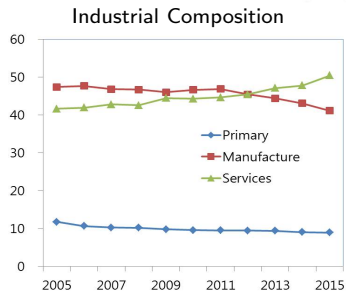
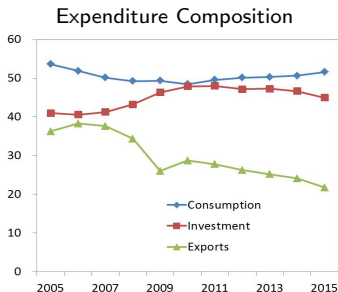
Asian country growth rates
(2002-07 vs 2010-15)



Note: Blue and red dots represent the periods of 2002-07 and 2010-15, respectively.

Shift of Growth Model

- Chinese economy undergoing structural shift, from exports and investment intensive growth to domestic and consumption oriented model
- Recently, service sector share increased to 50% of output



Sources: HAVER, IMF WEO database

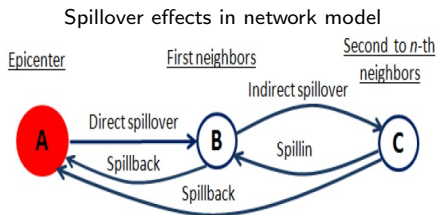
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 - Trade Connectedness: Network Model
 - Consideration 1: China's Economic Size Effects
 - Consideration 2: Decomposition of exports by structural factors
 - Consideration 3: Region-wide Effects
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Trade Connectedness: Network Model Approach I

- Network Model: A. Kireyev and A. Leonidov (2015, IMF)
- Model captures not only direct spillover effects, but also second round spillover effects
- Data: 2014 trade matrix of WTO

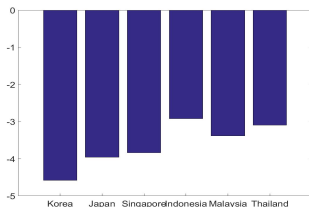


Source: A. Kireyev and A. Leonidov (2015, IMF).

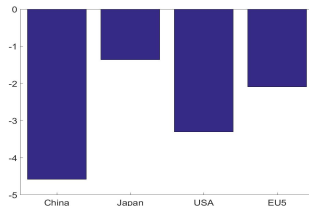
Trade Connectedness: Network Model Approach II

- To Chinese import shock, Korean exports shrink more than those of other Asian economies
 - Total spillover effects (-4.8%) twice as large as direct spillover effect (export share $0.26 \times 10\% = 2.6\%$)
- A Chinese import shock affects Korea more than other economies.

Export responses to
10% Chinese import shock

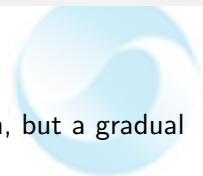


Korean export responses to 10% import
shocks in major economies



Source: BOK staff calculations

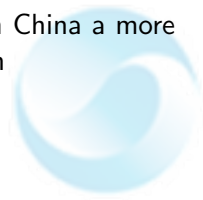
What Does Close Connectedness of Korean Exports to Chinese Economy Mean?



- Shift in Chinese growth model not a new phenomenon, but a gradual process since middle 2000s
- The snap shoot does not show dynamics that trade has adapted
 - In a sense, close connectedness may just imply that Korean exports have adapted well to structural changes in China
 - Actually, market share of Korean exports in Chineses import market has risen recently and ranked first since 2013
- Necessary to investigate how Korean economy and exports have adapted to and evolved in new environment

China's Economic Size and Korean Growth I

- Effects on Korean economy due to GDP increments in China a more relevant index for gauging impact of China's slowdown



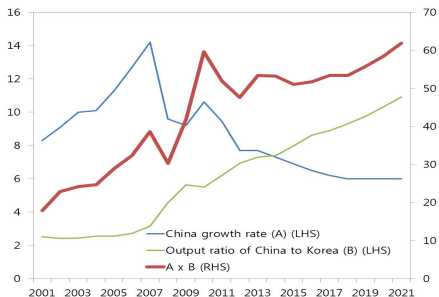
$$\begin{aligned}
 \frac{\Delta Y_{K,t}}{Y_{K,t-1}} &\approx \frac{\Delta X_{K,t}}{Y_{K,t-1}} \\
 &\approx \frac{\Delta X_{KC,t}}{Y_{K,t-1}} \\
 &\approx \frac{\Delta M_{CK,t}}{Y_{K,t-1}} \\
 &\approx \frac{\Delta Y_{C,t}}{Y_{K,t-1}} = \frac{Y_{C,t-1}}{Y_{K,t-1}} \frac{\Delta Y_{C,t}}{Y_{C,t-1}}
 \end{aligned}$$

Y_K , Y_C , X_{KC} , and M_{CK} represent Korean output, Chinese output, Korean exports to China, and Chinese imports from Korea, respectively.

China's Economic Size and Korean Growth II

- Considering size of Chinese economy, impact on Korean economy due to Chinese growth decline may be moderate

Chinese GDP increment effects on Korean economy



Sources: IMF WEO database, BOK staff calculations

Decomposition of Korean Exports to China, by Chinese Structural Factors

- Decomposition of Korean exports to China driven by structural factors in Chinese economy: growth rate, economic structural change, and technological advance.

$$M_t \approx M_{t-1} \frac{Y_t}{Y_{t-1}} + (\gamma_{t-1} \Delta \alpha_t) Y_t + (\Delta \gamma_t \alpha_{t-1}) Y_t$$

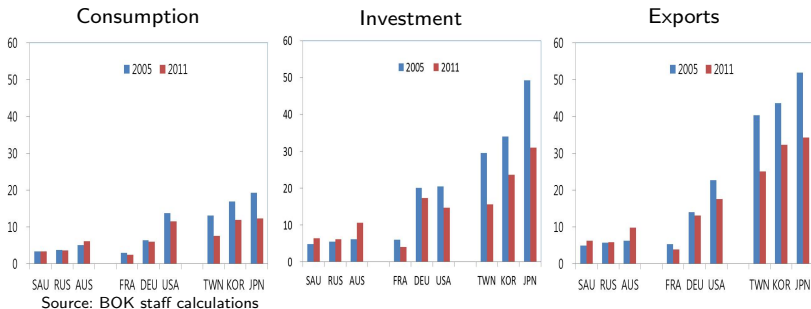
Exports Economic growth Compositional change Technological advance

where M , Y , γ and α stand for imports to China from Korea, Chinese GDP, the import intensities (by technological level) and the Chinese GDP composition ratios, respectively (derivation, see *Appendix*).

Imports Induced by Chinese Final Demand (γ_t)

- Investment and exports induce more imports than consumption does.
- Imports from East Asian countries declined between 2005 and 2011.
- Commodity exporting economies have Meanwhile seen some gains.

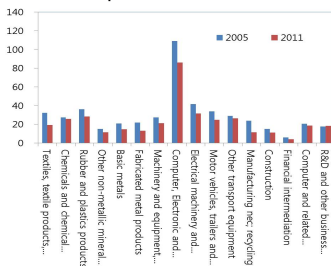
Import responses to \$1,000 increases in final demand components



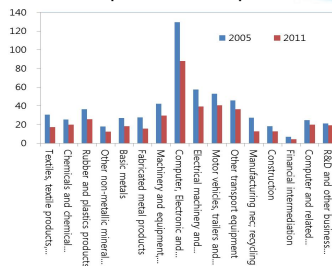
Import Inducing Ratios, by Chinese Industry

- Little import substitution between source countries
- Between 2005 and 2011, imports from both Japan and Korea reduced to similar extents across industries

Imports from Korea



Imports from Japan



Note: The import responses are to a \$1,000 increase in final demand in the Chinese economy.

Source: BOK staff calculations

Decomposition of Korean Exports to China, by Chinese Structural Factors I

- Since mid-2000s, Korean exports negatively influenced by compositional changes and technological advances in China
- Impact on Korean exports of compositional change in Chinese output larger since 2011

Decompositon of Chinese imports from Korea

(billion dollars, %)

	Growth	Compositional Change	Technology	Actual Imports
00-05	44.0 (100.0)	6.8 (15.4)	26.0 (59.2)	59.4 (174.6)
05-11	249.5 (100.0)	-14.9 (-6.0)	-71.9 (-28.8)	162.7 (65.2)
11-15	240.1 (100.0)	-26.5 (-11.0)	-39.1 (-16.3)	174.5 (72.7)

Source: BOK staff calculations

Decomposition of Korean Exports to China, by Chinese Structural Factors II

- Negative influence of Chinese structural changes relatively smaller on Korean exports
- Impacts of technological advance in China:
 2005-11: Taiwan (-42.7%) > Japan (-36.4%) > Korea (-28.8%)
 2011-15: Japan (-39.7%) > Korea (-16.3%) > Taiwan (-11.4%)

Decompositions of Chinese imports from Japan and Taiwan

(billion dollars, %)

	Japan				Taiwan			
	Growth	Compositional Change	Technology	Actual Imports	Growth	Compositional Change	Technology	Actual Imports
00-05	78.7 (100.0)	14.5 (18.4)	7.3 (9.2)	100.5 (127.7)	48.3 (100.0)	7.5 (15.5)	18.9 (39.1)	74.7 (154.5)
05-11	326.2 (100.0)	-12.9 (-4.0)	-118.7 (-36.4)	194.6 (59.6)	242.6 (100.0)	-14.0 (-5.8)	-103.7 (-42.7)	124.9 (51.5)
11-15	287.2 (100.0)	-30.2 (-10.5)	-114.0 (-39.7)	143.0 (49.8)	184.4 (100.0)	-20.1 (-10.9)	-21.0 (-11.4)	143.3 (77.7)

Source: BOK staff calculations

Decomposition of Korean Exports: Global Dynamic Factor Model I

- Trade determined by global and regional factors as use of gravity model implies
- Data: Asian emerging economies (7), advanced economies (9); Jan 2000 - Jun 2016

$$x_{i,t} = b_{i,1}f_t^{global} + b_{i,2}f_t^{regional(j)} + u_{i,t}$$

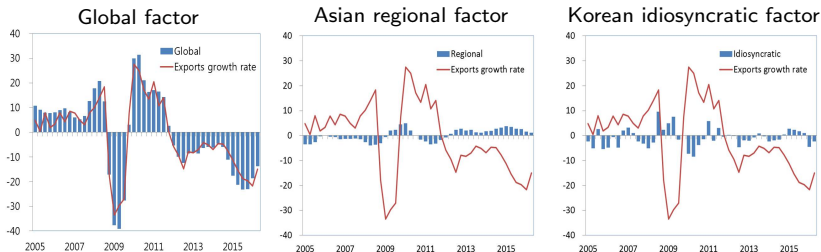
$$u_{i,t} = \theta_{i,1}u_{i,t-1} + \theta_{i,2}u_{i,t-2} + \epsilon_{i,t}, \text{ where } \epsilon_{i,t} \sim iidN(0, \sigma_{\epsilon,i}^2)$$

$$f_{j,t} = \phi_{j,1}f_{j,t-1} + \phi_{j,2}f_{j,t-2} + \eta_{j,t}, \text{ where } \eta_{j,t} \sim iidN(0, \sigma_{\eta,j}^2)$$

where $x_{i,t}$, f_t^{global} , $f_t^{regional(j)}$ and $u_{i,t}$ stand for the export growth rate of country i , the global factor, the j regional factor, and the idiosyncratic factor of country i , respectively.

Decomposition of Korean Exports: Global Dynamic Factor Model II

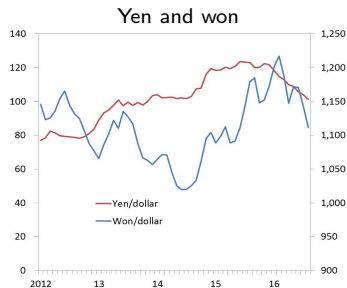
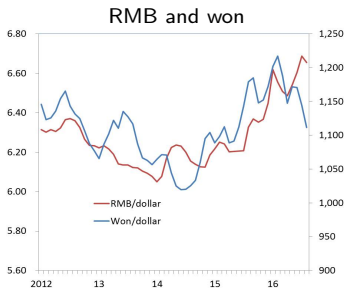
- The regional factor, which must be heavily influenced by Chinese exports, has contributed positively to Korean exports.
- Global factor the most dominant, and the factor dragging down Korean export growth



Source: BOK staff calculations

RMB Depreciated since Second Half of 2015

- Won freely determined by foreign exchange market conditions, has moved mostly along with RMB
- Recent divergence of won from RMB seems to reflect appreciation of yen, the currency of another important export competitor

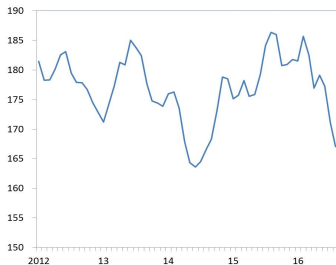


Source: The Bank of Korea

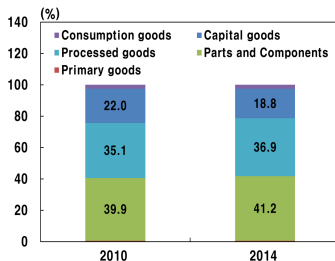
RMB Depreciation May Not Be Serious Concern for Korean Economy

- RMB and won have shown strongly synchronized trends and maintained relatively stable ratio
- RMB depreciation, which will support Chinese exports, may increase China's intermediate goods imports from Korea.

Won/RMB trends



Composition of China's imports from Korea



Sources: The Bank of Korea, WTO, BOK staff calculations

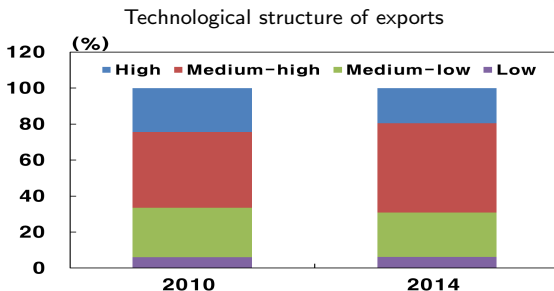
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Shift in Technological Structure of Exports

- Share of medium-high level technological goods increasing



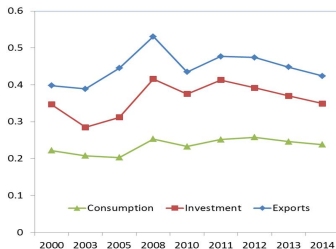
Note: Technological structure based on ISIC REV.3 of OECD, which classifies industries by R&D intensity.

Sources: UN Comtrade, BOK staff calculations

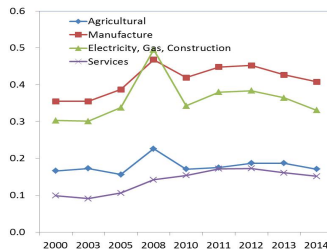
Domestic Contents in Korean Export Goods I

- Increased domestic contents in Korean exports since second half of 2000s
- Rising domestic contents in export goods mitigate impacts of export slowdown on GDP growth

Import intensities of final demand in Korea



Import intensities of industries in Korea



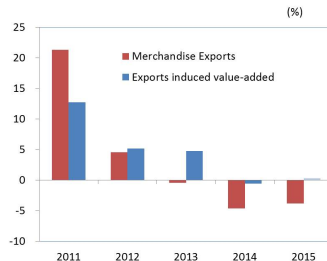
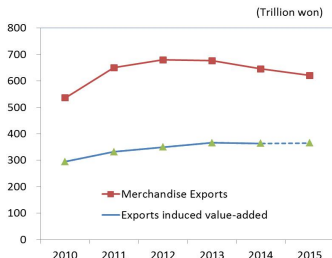
Note: The import intensity of an industry is the average of those of its sub-industries.

Source: The Bank of Korea

Domestic Contents in Korean Export Goods II

- Considering domestic contents in exports, and Korean won appreciation, impacts on income of decreased exports seem quite moderate

Merchandise exports and their value-added
(by won) (by growth rate)



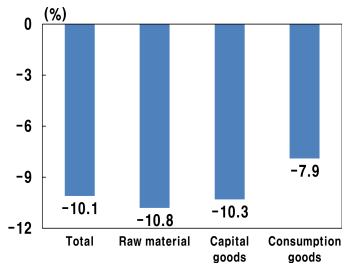
Note: Import intensities of 2015 projected linearly recent trends

Source: BOK staff calculations

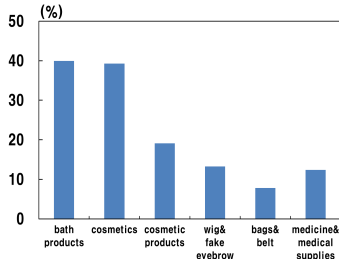
Recent Growth in Consumer Goods Exports

- Consumption goods exports declined less than capital or intermediate good exports
- Recently, exports to Asian countries of cosmetics, clothing, and luxury accessory goods have increased rapidly.

Export growth, by goods category



Export growth in consumption goods



Note: Growth rates calculated as exports from January to August 2016 compared to those during same period of 2015

Source: The Bank of Korea

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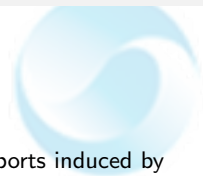
Takeaways

- Everybody knows: The slowdown and structural shifts of Chinese economy has been affecting Korean economy enormously.
- However, we need to also consider that Korean economy has been adapting to the new evolving environment.
 - In taking the Chinese economy size into account, its slowdown may have milder impact on Korean economy.
 - Korean economy has relatively well evolved to accommodate to the change in demand of China.
 - The domestic contents of Korean exports has risen recently.
 - The consumption goods may become a next core sector in Korean exports.

Thank you !



Decomposition of Korean Exports to China, by Chinese Structural Factors I



$$M_t = M_t^C + M_t^I + M_t^X$$

where M_t , M_t^C , M_t^I and M_t^X are imports to China from Korea, and imports induced by consumption, investment and exports, respectively.

$$\begin{aligned} M_t &= \gamma_t^C C_t + \gamma_t^I I_t + \gamma_t^X X_t, & \gamma_t^C &= \frac{M_t^C}{C_t}, \gamma_t^I = \frac{M_t^I}{I_t}, \gamma_t^X = \frac{M_t^X}{X_t} \\ \frac{M_t}{Y_t} &= \gamma_t^C \frac{C_t}{Y_t} + \gamma_t^I \frac{I_t}{Y_t} + \gamma_t^X \frac{X_t}{Y_t} \\ &= \gamma_t^C \alpha_t^C + \gamma_t^I \alpha_t^I + \gamma_t^X \alpha_t^X, & \alpha_t^C &= \frac{C_t}{Y_t}, \alpha_t^I = \frac{I_t}{Y_t}, \alpha_t^X = \frac{X_t}{Y_t} \\ &= (\gamma_{t-1}^C + \Delta \gamma_t^C)(\alpha_{t-1}^C + \Delta \alpha_t^C) + (\gamma_{t-1}^I + \Delta \gamma_t^I)(\alpha_{t-1}^I + \Delta \alpha_t^I) \\ &\quad + (\gamma_{t-1}^X + \Delta \gamma_t^X)(\alpha_{t-1}^X + \Delta \alpha_t^X) \end{aligned}$$

Decomposition of Korean Exports to China, by Chinese Structural Factors II

$$\begin{aligned}
 &= \frac{M_{t-1}}{Y_{t-1}} + \gamma_{t-1}^C \Delta \alpha_t^C + \Delta \gamma_t^C \alpha_{t-1}^C + \Delta \gamma_t^C \Delta \alpha_t^C \\
 &\quad + \gamma_{t-1}^I \Delta \alpha_t^I + \Delta \gamma_t^I \alpha_{t-1}^I + \Delta \gamma_t^I \Delta \alpha_t^I \\
 &\quad + \gamma_{t-1}^X \Delta \alpha_t^X + \Delta \gamma_t^X \alpha_{t-1}^X + \Delta \gamma_t^X \Delta \alpha_t^X \\
 &\approx \frac{M_{t-1}}{Y_{t-1}} + (\gamma_{t-1}^C \Delta \alpha_t^C + \gamma_{t-1}^I \Delta \alpha_t^I + \gamma_{t-1}^X \Delta \alpha_t^X) \\
 &\quad + (\Delta \gamma_t^C \alpha_{t-1}^C + \Delta \gamma_t^I \alpha_{t-1}^I + \Delta \gamma_t^X \alpha_{t-1}^X)
 \end{aligned}$$

$$M_t \approx M_{t-1} \frac{Y_t}{Y_{t-1}} + (\gamma_{t-1} \Delta \alpha_t) Y_t + (\Delta \gamma_t \alpha_{t-1}) Y_t$$

It is notable that we can calculate $(\Delta \gamma_t \alpha_{t-1}) Y_t$ as a residual, even though γ_t is yet surveyed in the TiVA dataset.