



# Debating on the Localization Rate in China: Macro and Micro Perspective

Panpan Yang and Xiaomin Cui\*

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\* Panpan Yang, associate research fellow, [pamelapanda@126.com](mailto:pamelapanda@126.com); Xiaomin Cui, assistant research fellow, [sunnilizzie@163.com](mailto:sunnilizzie@163.com), Institute of World Economy and Politics, Chinese Academy of Social Sciences.

# Outline

- Motivation
- Construct measures of the Localization Rate
- China Facts and International Comparison
- Government Subsidies and DVARs
- Conclusions

## ➤ USA: The “Section 301 Report”

- The *Made in China 2025 Notice* expressly calls for China to achieve **40% “self-sufficiency” by 2020**, and **70% “self-sufficiency” by 2025**, in core components and critical materials in a wide range of industries, including aerospace equipment and telecommunications equipment.
- The manufacture of new energy vehicles (NEVs), which includes plug-in hybrids, electric batteries and fuel cell vehicles. In 2012, the State Council released the Energy-Saving and New-Energy Automotive Industry Development Plan (2012-2020) (**NEV Plan**), which set forth an industrial development blueprint for NEVs calling for the establishment of numerous **regulations and subsidy programs to support domestic R&D, manufacturing, and utilization of NEVs**.

## ➤ China (Non-official opinion): more policies to support high-tech industries

- U.S. announced a ban preventing American companies from selling components to Chinese telecommunications giant ZTE (April 2018) and HUAWEI (May 2019).

## ➤ **Two Issues**

- Based on historical changes and international comparisons, is it necessary for China to set forth the domestic production localization targets?
- Are government policies, such as subsidies, effective in promoting the localization rate?

## ➤ **To address these issues,**

- Construct measures of the localization rate;
- From the macro perspective, we organize China facts and conduct international comparison;
- From the micro perspective, we discuss the empirical relationship between government subsidies and domestic value added ratios (DVARs);

# How to measure the localization rate?

## ➤ Macro Level (OECD TiVA Database)

- the ratio of intermediate goods in total imports;
- the ratio of re-exported intermediate imports in total intermediate imports;
- the DVAR of the final demand;
- the DVAR of exports;

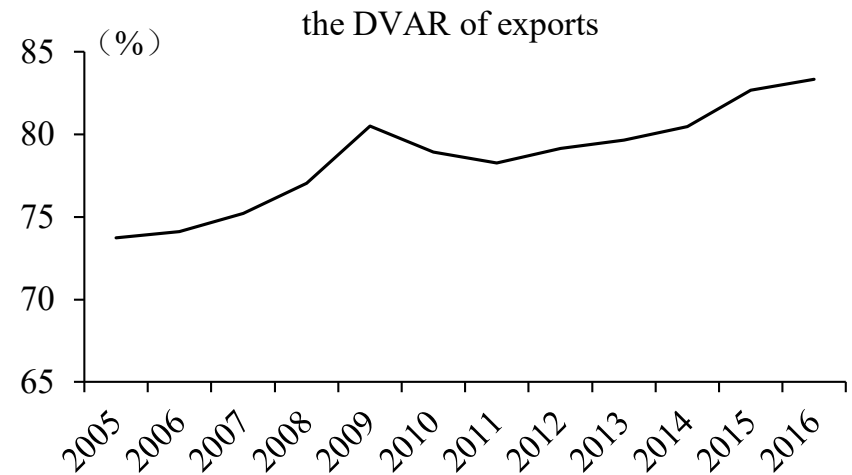
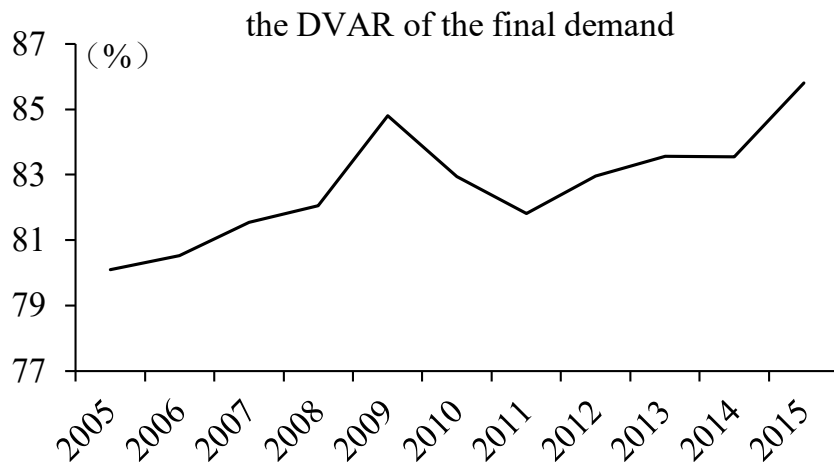
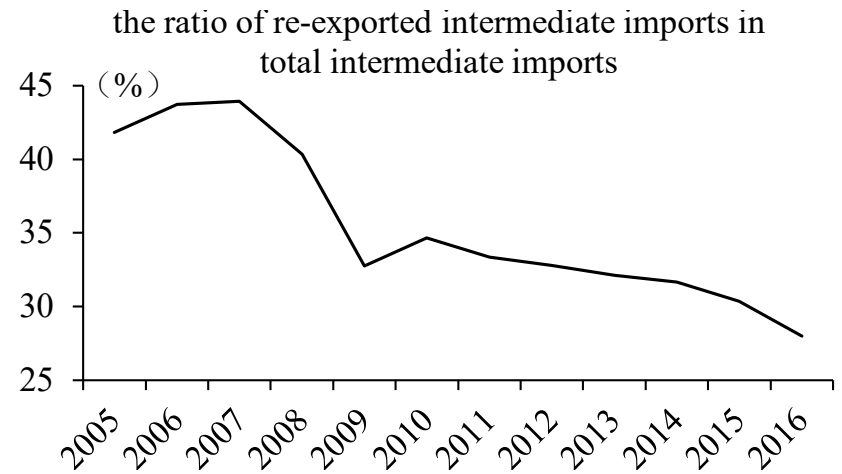
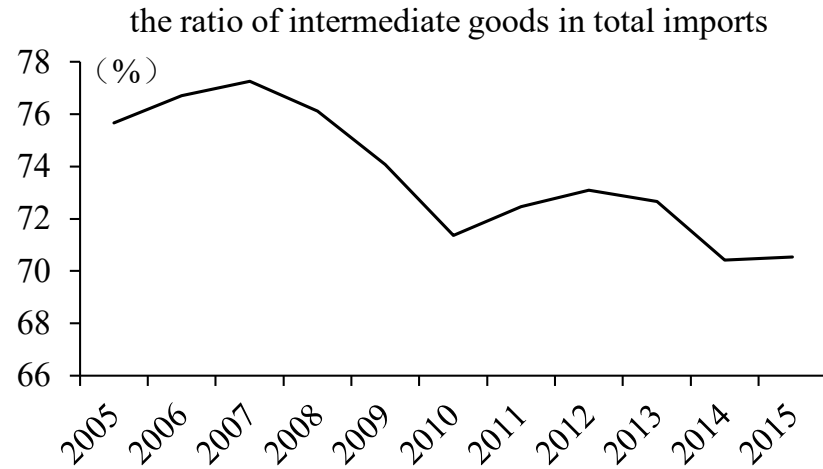
## ➤ Micro Level (the ASIF Data Set and the Trade Data from the Customs)

- Following Kee and Tang (2016), we construct the firm-level DVAR,

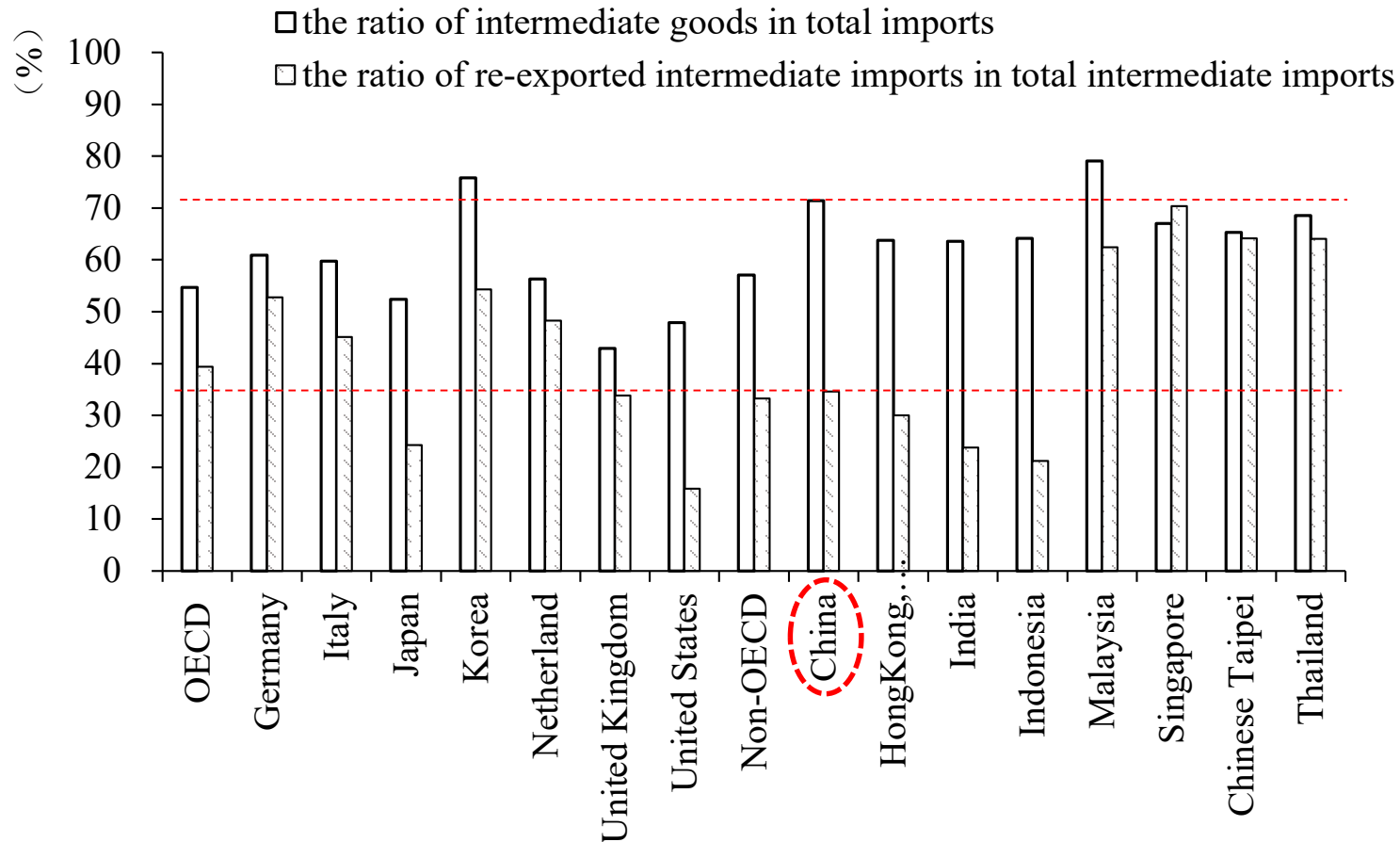
$$DVAR_{itl} = \begin{cases} 1 - \frac{IMP_{it1} - \delta_{it1}^K + \delta_{it1}^F}{Y_{it1}}; l = 1 \\ 1 - \frac{IMP_{it2} - \delta_{it2}^K |_{BEC} + \delta_{it2}^F}{Y_{it2}}; l = 2 \\ \omega_{it1} \left(1 - \frac{IMP_{it1} - \delta_{it1}^K + \delta_{it1}^F}{Y_{it1}}\right) + \omega_{it2} \left(1 - \frac{IMP_{it2} - \delta_{it2}^K |_{BEC} + \delta_{it2}^F}{Y_{it2}}\right); l = 3 \end{cases}$$

# China facts and international comparison

**Figure 1 The Localization Rate of China at the Aggregate Level (2005-2016)**

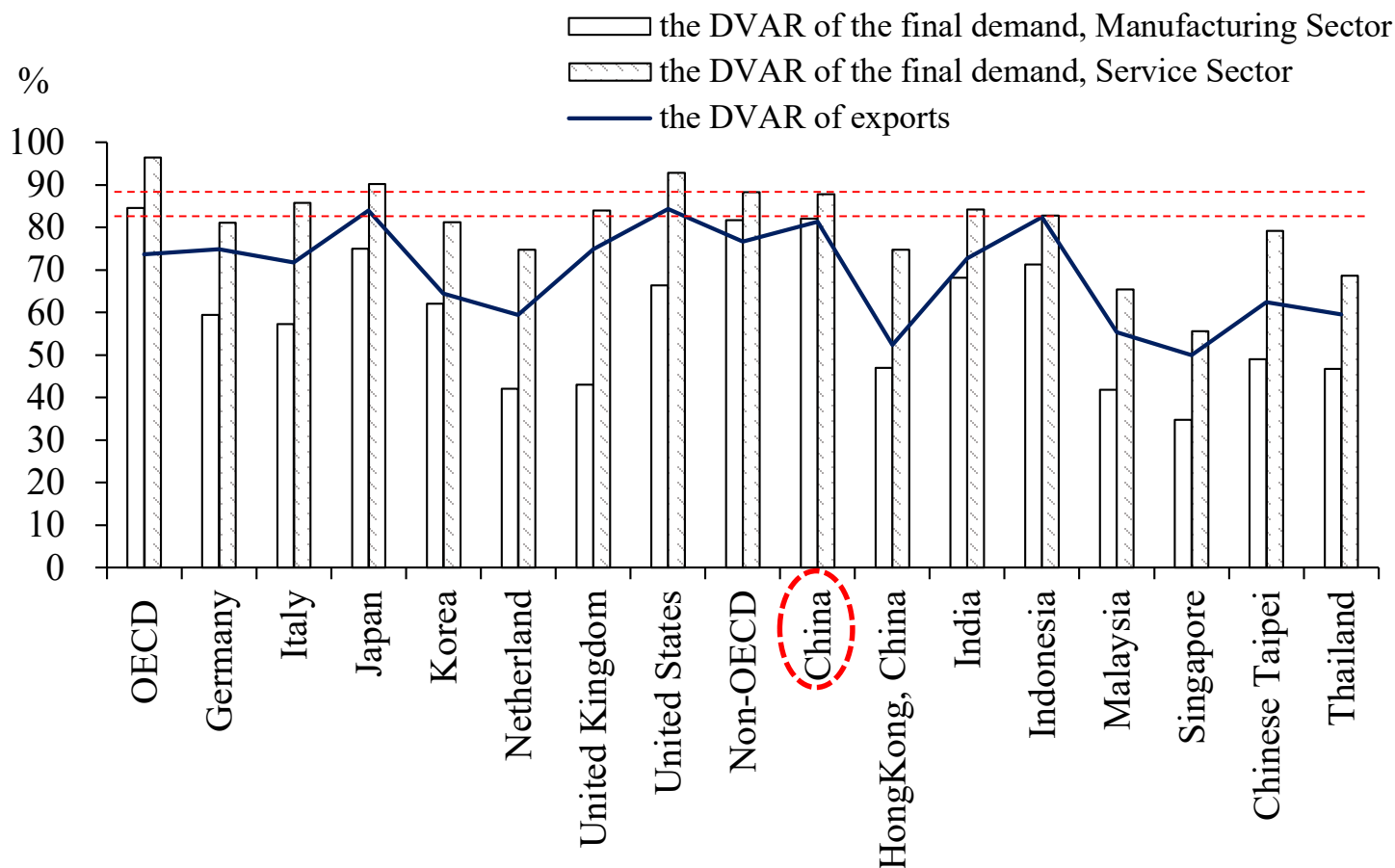


# China facts and international comparison



**Findings:** It is common for the manufacturing sectors of Asian economies to have a relatively high proportion of intermediate imports in total imports. China's share of intermediate imports is similar to that of Germany and South Korea.

# China facts and international comparison



**Findings:** China's localization rates of manufacturing sectors are not lower than those of other countries at similar development stage and developed economies. The DVAR of the final demand of China's manufacturing sector is significantly higher than those of other economies, but its DVAR of the final demand of the service industry is lower than the levels of United States and Japan.



# The Service Industries

**Table 1 The DVARs of the Final Demand of Service Sectors (2015, %)**

Industry	China	United States	Japan	Eurozone, 12 Core countries
<b>Construction</b>	98.9	98.5	98.9	97.8
<b>Services</b>	87.7	92.8	90.2	88.2
<b>Wholesale and retail trade; repair of motor vehicles</b>	80.2	83.4	85.0	78.5
<b>Transportation and storage</b>	80.3	77.3	80.4	78.1
<b>Accommodation and food services</b>	84.4	92.0	94.2	91.2
<b>Publishing, audiovisual and broadcasting activities</b>	61.1	96.8	84.9	83.6
<b>Telecommunications</b>	93.5	94.2	93.3	81.5
<b>IT and other information services</b>	75.2	86.6	87.3	84.0
<b>Financial and insurance activities</b>	92.3	91.4	81.1	77.2
<b>Real estate activities</b>	94.7	98.2	97.6	96.9
<b>Other business sector services</b>	79.0	89.7	78.8	80.0
<b>Public admin. and defense; compulsory social security</b>	98.5	99.6	98.9	98.9
<b>Education</b>	96.2	98.7	97.6	97.6
<b>Human health and social work</b>	92.8	98.0	98.3	97.7
<b>Other social and personal services</b>	94.3	96.6	98.0	96.0

# Three patterns

- **The Japanese pattern**
- **The US pattern**
- **The European pattern**

Table 2 The Dependence of Four European Countries on Other EU countries (2015, %)

	France		Germany		Italy		Netherland	
	EU15	EU13	EU15	EU13	EU15	EU13	EU15	EU13
<b>The share of intermediate inputs from EU countries in total intermediate inputs</b>	52.00	0.05	43.66	13.45	45.12	7.30	46.02	3.79
<b>The value added of the final demand from EU countries in total foreign value added</b>	46.27	5.05	38.51	9.77	42.81	6.69	44.72	4.33

# Summary

- The DVARs of China's manufacturing industries are significantly higher than those of other main economies, but its DVARs of service industries are lower than that of USA and JPN.
- The Japanese pattern is that both of the localization rates of exports and domestic final demand are high.
- The US pattern is that the localization rate of exports is high, but its DVAR of domestic final demand of manufacturing sector is low.
- The European pattern is that both of the localization rates of exports and domestic final demand are relatively low. But the dependence of European countries on external inputs is mainly from the countries within the EU region.
- The manufacturing and service industries of China should have different focuses in the next stage of opening up.

## ➤ Literature Review

- Researches on the positive effect of government subsidies on exports in the literature are usually based on gross values, and few studies are from the perspective of **value added** (Cai, 2018). The misallocation effect of subsidies (Zhou et al., 2014), the effects on export product quality (Zhang et al., 2015), firms' productivities (Shao and Bao, 2012), purchasing behavior (Liu et al., 2012), price markups (Ren and Zhang, 2013), innovation (Yang et al., 2015; Mao and Xu, 2015), corporate risk-taking (Mao and Xu, 2016) and the survival of enterprises (Xu and Mao, 2016).
- Government subsidies are an important factor in triggering global **trade frictions** and the unfair practices that the US has accused the Chinese government of.
- Kee and Tang (2011) propose the measures of firm-level DVARs. **The determinants of firms' DVARs**, such as foreign capital inflow and trade liberalization (Zhang et al., 2013; Kee and Tang, 2016; Zhang and Tang, 2018; Mao and Xu, 2018, 2019), the underestimation of the prices of domestic intermediate inputs (Gao et al., 2018), the industrial and spatial agglomeration (Shao and Su, 2019; Yan and Yu, 2019), and trade transformation and upgrading policies (Hu and Li, 2019), monopolies in upstreaming manufacturing sectors (Li and Mao, 2017), market segmentation policies of local governments (Lyu et al., 2018), RMB appreciation (Yu and Cui, 2018), and minimum wages (Cui et al., 2018).

# Government Subsidies and DVARs

## ➤ The Empirical Specification

- the DVAR of sales in market  $r$  is given by,

$$DVAR_{it}^r = 1 - \frac{Q_t^I M_{it}^{Ir}}{P_{it}^r Y_{it}^r} = 1 - \frac{Q_t^I M_{it}^{Ir}}{Q_t M_{it}^r} \frac{Q_t M_{it}^r}{C_{it}^r} \frac{C_{it}^r}{P_{it}^r Y_{it}^r} = 1 - \frac{\kappa_{it}^r \alpha_{it}^r}{1 + \mu_{it}^r}, r \in \{D, X\}$$

$$\ln(FVAR_{it}^r) \equiv \ln(1 - DVAR_{it}^r) = \ln \kappa_{it}^r + \ln \alpha_{it}^r - \ln(1 + \mu_{it}^r)$$

- Inspired by this equation, we specify a log-linear empirical specification at the firm level to study the effect of government subsidies on firms' DVARs.

$$\ln(FVAR_{it}^r) \equiv \ln(1 - DVAR_{it}^r) = \beta_0 + \beta_1 \ln(subsidy_{it}) + \beta_2 X_{it} + \lambda_i + \iota_t + \zeta_{it}$$

- $FVAR_{it}$  denotes the foreign value added ratio.
- $subsidy_{it}$  denotes government subsidies obtained by firm  $i$  in year  $t$ .
- $X_{it}$  denotes the firm-level covariates, including dummy variables of foreign invested enterprises (FIEs), state-owned enterprises (SOEs), the shares of SOEs and FIEs in the industry, minimum wage, effective RMB exchange rate at the industry level and et al.
- $\lambda_i$  and  $\iota_t$  denote firm- and year- specific fixed effects, respectively.
- $\zeta_{it}$  denotes idiosyncratic shock.

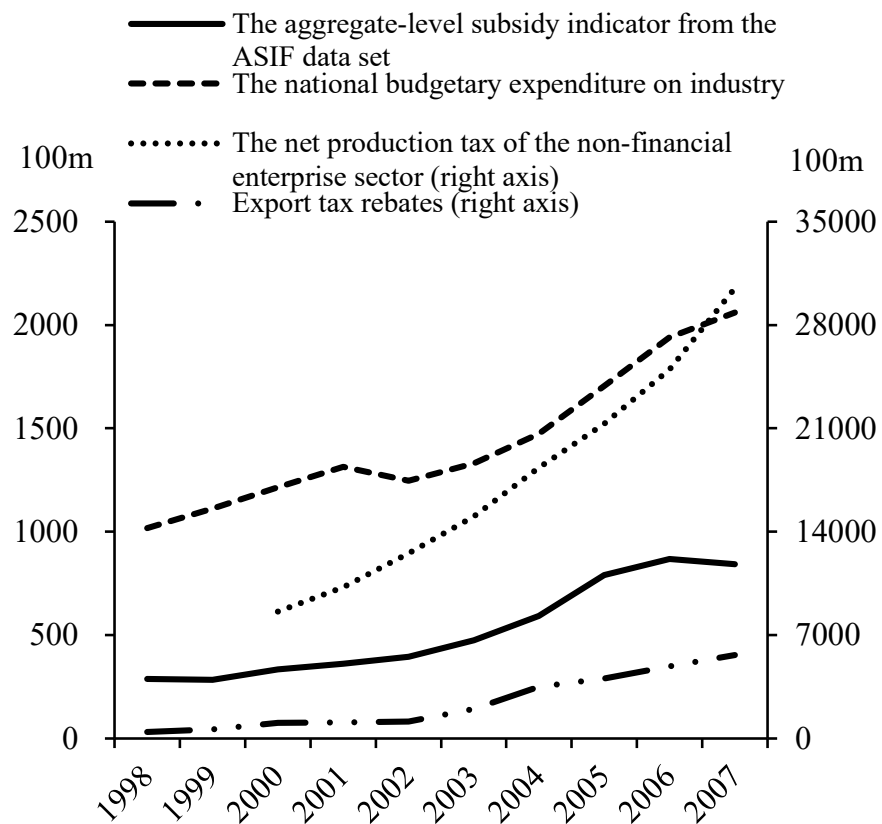
# Government Subsidies and DVARs

## ➤ Data

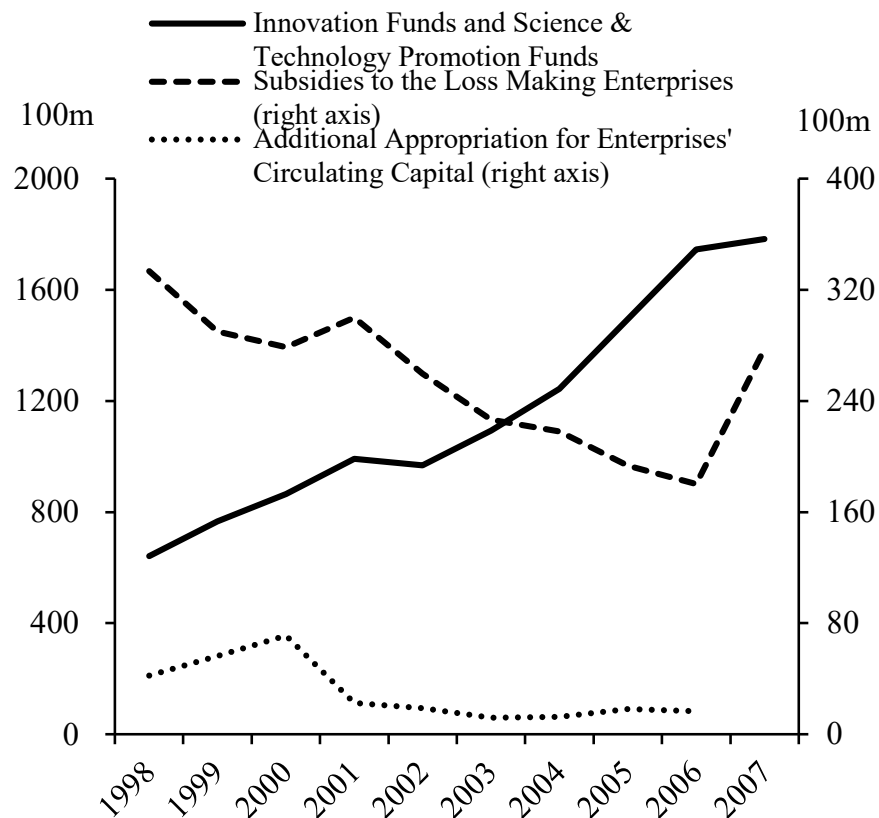
- Micro-level empirical analysis mainly uses two data sets, the Annual Survey Data of Industrial Firms (ASIF) conducted by the National Bureau of Statistics of China, and the transaction-level trade data from the General Administration of Customs of China during 2000-2007.
- In addition to these two data sets, we also control for the city-year level minimum wage data from Cui et al. (2018), and the industry-level RMB effective exchange rate index from the Heterogeneous Effective Exchange Rate Database (IWEP - HEER Database).
- The subsidy variable from the ASIF data set and the “production subsidy” in the *System of National Accounts 2008* are closer by definition, which shall not include the social benefits that governments make directly to households, the grants that governments may make to enterprises in order to finance their capital formation, or compensate them for damage to their capital assets (treated as capital transfers), and the repayment at the customs frontier of taxes on products previously paid on goods or services while they were inside the economic territory.

# Government Subsidies and DVARs

**Figure 4-1 Different Subsidy Indicators**



**Figure 4-2 Chinese National Budgetary Expenditure on Industry**



Source: The ASIF data set, the China Fiscal Yearbook, and the CEIC database.

# Government Subsidies and DVARs

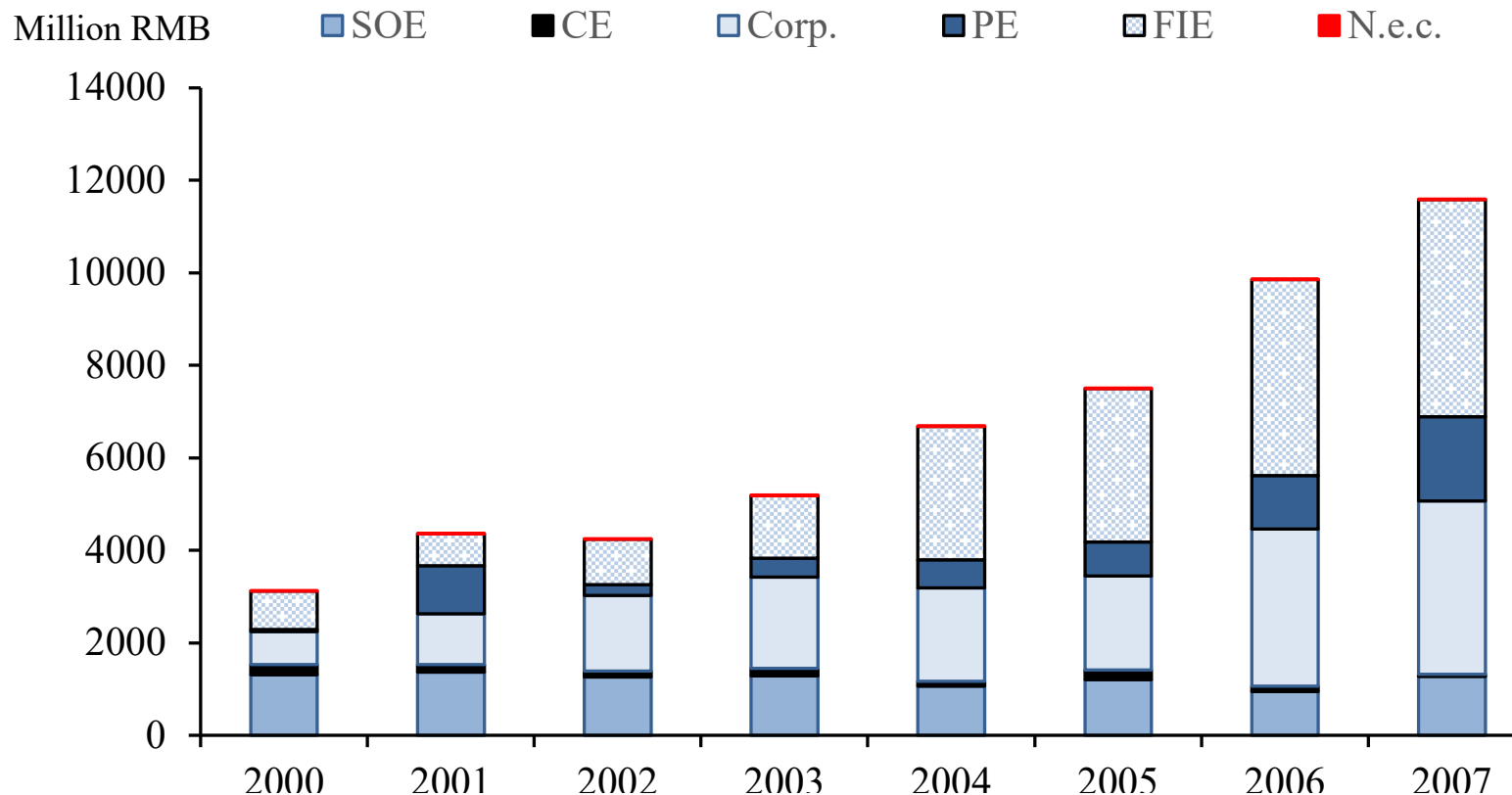
**Table 3 Summary Statistics**

Variables	Observations	Mean	Standard deviation
DVAR	196,540	0.80	0.23
FVAR	196,540	0.20	0.23
Subsidies	196,540	267	5076
Subsidies/Sales	196,415	0.002	0.04
The proportion of SOEs in the 4-digit CIC industry	3,898	0.14	0.16
The proportion of FIEs in the 4-digit CIC industry	3,962	0.22	0.14
SOE Dummy	196,540	0.03	0.16
Collective enterprise (CE for short) Dummy	196,540	0.02	0.15
Corporation (Corp. for short) Dummy	196,540	0.11	0.32
Private enterprise (PE for short) Dummy	196,540	0.24	0.43
FIE Dummy	196,540	0.60	0.49
Unclassified enterprise (N.e.c. for short) Dummy	196,540	0.002	0.05
Minimum wage	2,687	351	129
ln(Industry-level RMB effective exchange rate)	656	106	13.6
Dummy variable for firms with high-level productivity	196,540	0.26	0.44
Dummy variable for firms with high-level capital-to-labor ratio	196,540	0.24	0.43
Dummy variable for firms with high-level firm size	196,540	0.24	0.43



# Government Subsidies and DVARs

**Figure 5 The Distribution of Government Subsidies across Ownership Categories**

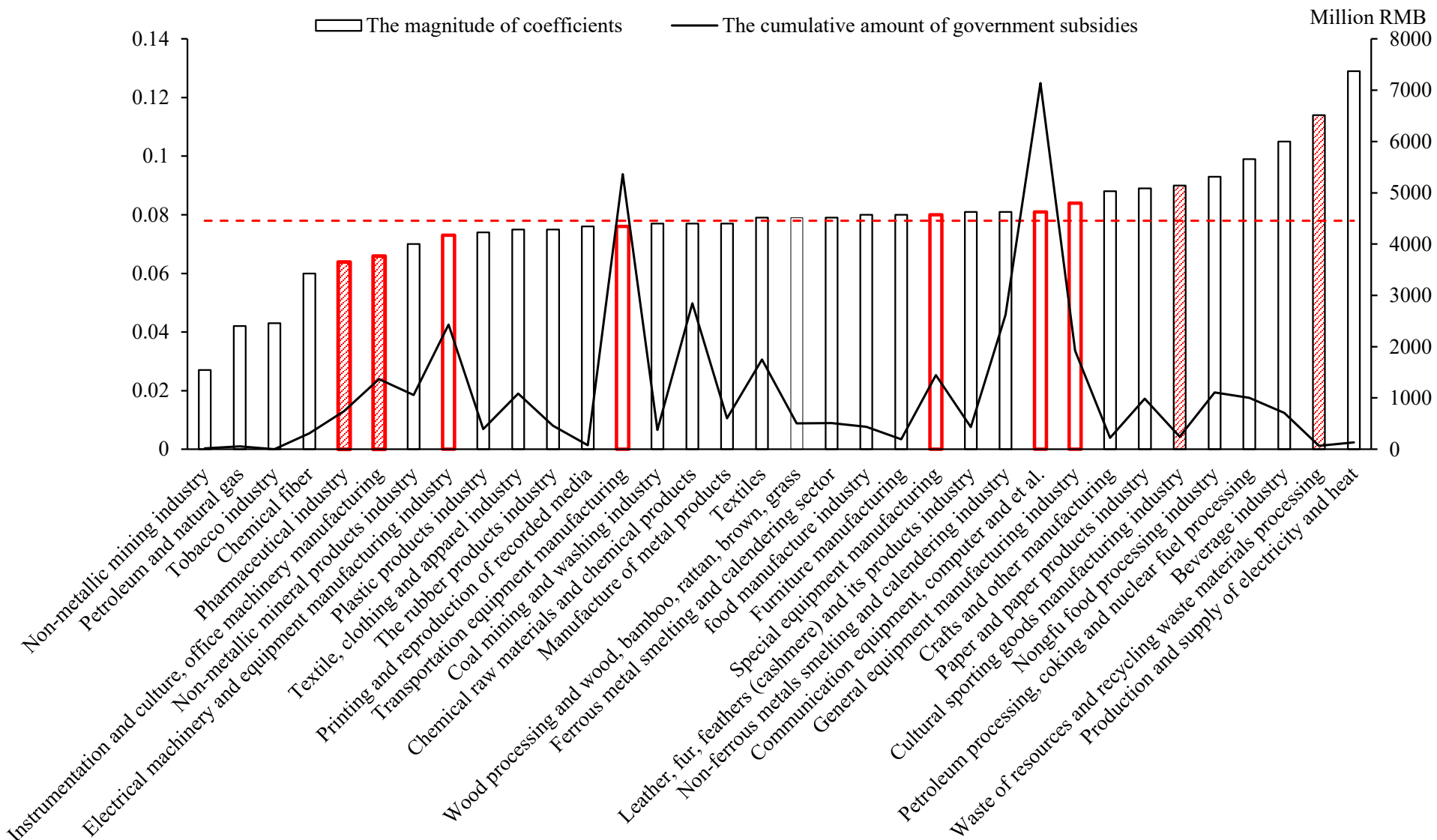


Note: This figure is based on the matched data with DVAR ranging over (0,1). SOE, CE, Corp., PE, FIE, and N.e.c. are short for state-owned enterprise, collective enterprise, corporation, private enterprise, foreign-invested enterprises, and unclassified enterprise. From bottom to top, the bars correspond to the subsidies received by SOEs, CEs, corporations, PEs, FIEs and other unclassified enterprises.

# Government Subsidies and DVARs

Dependent Variable	ln(FVAR)			ln(DVAR)	
	(1)	(2)	(3)	(4)	(5)
ln(Subsidy)	-0.040*** (-34.724)	0.004*** (3.312)	0.006* (1.854)	0.006*** (3.727)	-0.0003 (-0.407)
ln(Subsidy) × Corp. dummy			-0.001 (-0.265)		
ln(Subsidy) × PEs dummy			-0.001 (-0.168)		
ln(Subsidy) × FIEs dummy			-0.006* (-1.705)	-0.006*** (-2.669)	0.002 (1.368)
The proportion of SOEs in the 4-digit CIC industry	0.129*** (34.018)	0.038*** (5.413)	-0.074*** (-5.159)	-0.074*** (-5.161)	0.039*** (5.768)
The proportion of SOEs in the 4-digit CIC industry × Corp. dummy			0.045*** (3.199)	0.045*** (3.198)	-0.014** (-2.258)
The proportion of SOEs in the 4-digit CIC industry × PEs dummy			0.018 (1.315)	0.018 (1.311)	0.004 (0.685)
The proportion of SOEs in the 4-digit CIC industry × FIEs dummy			0.149*** (11.184)	0.149*** (11.197)	-0.059*** (-10.070)
The proportion of FIEs in the 4-digit CIC industry	0.356*** (73.838)	0.047*** (3.584)	0.009 (0.388)	0.009 (0.382)	0.006 (0.618)
The proportion of FIEs in the 4-digit CIC industry × Corp. dummy			-0.014 (-0.688)	-0.014 (-0.675)	0.001 (0.095)
The proportion of FIEs in the 4-digit CIC industry × PEs dummy			-0.025 (-1.184)	-0.024 (-1.173)	0.016* (1.763)
The proportion of FIEs in the 4-digit CIC industry × FIEs dummy			0.056** (2.438)	0.057** (2.441)	-0.020* (-1.745)
Firm-specific FEs	No	Yes	Yes	Yes	Yes

# The Industry-Level Heterogeneous Effect of Subsidies on DVARs



# The Mechanisms of Government Subsidies

Dependent Variables	$\ln(1 + \mu_{it}^r)$		$\ln \kappa_{it}^r$		$\ln \alpha_{it}^r$	
	No (1)	Yes (2)	No (3)	Yes (4)	No (5)	Yes (6)
ln(Subsidy)	-0.001 (-0.811)	-0.002** (-2.179)	0.018 (1.148)	0.025 (1.458)	0.003 (1.274)	-0.003 (-1.544)
ln(Subsidy) × Corp. dummy	-0.0001 (-0.111)	0.0001 (0.084)	-0.001 (-0.071)	0.006 (0.309)	-0.002 (-0.871)	-0.004 (-1.461)
ln(Subsidy) × PEs dummy	0.001 (0.722)	0.002 (1.625)	-0.014 (-0.726)	-0.014 (-0.699)	-0.003 (-1.329)	-0.003 (-1.182)
ln(Subsidy) × FIEs dummy	0.001 (0.826)	-0.0002 (-0.182)	-0.020 (-1.228)	-0.007 (-0.414)	-0.001 (-0.537)	-0.010*** (-4.096)
The proportion of SOEs in the 4-digit CIC industry	0.010** (2.082)	0.010** (2.110)	-0.084 (-1.319)	-0.083 (-1.306)	-0.019** (-2.127)	-0.024*** (-2.638)
The proportion of SOEs in the 4-digit CIC industry × Corp. dummy	-0.007 (-1.538)	-0.008 (-1.609)	0.077 (1.166)	0.077 (1.164)	0.018* (1.853)	0.019** (2.057)
The proportion of SOEs in the 4-digit CIC industry × PEs dummy	-0.009* (-1.836)	-0.009* (-1.909)	-0.052 (-0.765)	-0.052 (-0.761)	0.035*** (3.806)	0.036*** (3.991)
The proportion of SOEs in the 4-digit CIC industry × FIEs dummy	-0.011** (-2.431)	-0.011** (-2.427)	0.151** (2.444)	0.151** (2.431)	0.022** (2.539)	0.027*** (3.107)
The proportion of FIEs in the 4-digit CIC industry	-0.006 (-0.871)	-0.005 (-0.718)	0.093 (0.823)	0.083 (0.743)	0.025 (1.546)	0.025 (1.573)
The proportion of FIEs in the 4-digit CIC industry × Corp. dummy	0.007 (0.924)	0.006 (0.806)	0.012 (0.109)	0.017 (0.153)	0.002 (0.142)	0.001 (0.090)
The proportion of FIEs in the 4-digit CIC industry × PEs dummy	-0.0004 (-0.051)	-0.001 (-0.165)	-0.075 (-0.634)	-0.065 (-0.554)	-0.001 (-0.077)	-0.001 (-0.084)
The proportion of FIEs in the 4-digit CIC industry × FIEs dummy	0.003 (0.357)	0.002 (0.226)	0.017 (0.148)	0.027 (0.238)	-0.005 (-0.307)	-0.006 (-0.355)

# Government Subsidies and DVARs

## ➤ Robustness Checks

- Following Zhang and Zheng (2015), we use three alternative subsidy indicators, the ratio of subsidies to sales, the ratio of subsidies to total fixed assets and the ratio of subsidies to total assets, to check whether our findings are driven by scale effects.
- Use the subsample of manufacturing firms to replicate our baseline estimations.
- Exclude observations with negative subsidies, and our baseline findings still hold.
- Add observations with negative DVARs or DVARs ranging over 1 with Kee and Tang (2016) method.
- Control for dummy variables of pure processing exporters and hybrid exporters.
- Use the firm-level nominal effective exchange rate weighted by import shares in the initial year, the logarithm of one-period lagged labor productivity, the logarithm of one-period lagged capital-to-labor ratio, and the logarithm of one-period lagged sales to replace corresponding variables in the benchmark regression.
- Use the registration types in the ASIF data set to identify state-owned, collective, private, and foreign-invested enterprises, and corporations.

## ➤ Endogeneity Issue

- Following Girma et al. (2009), we take the level of employee social welfare benefits and state capital as exogenous instruments and obtain qualitatively similar results.

# Summary

- On the whole, government subsidies are not positively related to the localization rates;
- SOE reforms which create a fair competition environment for non-SOE firms, contribute to the improvement of localization rates;
- Although the total amount of subsidies received by representative industries is the most, subsidies have not contributed to the increase in the localization rates of these key industries;
- Discussions on the mechanisms show that two opposite forces lead to an overall insignificant effect of the subsidies on firms' DVARs. Above all, this logic based on China's micro data is consistent with what are found in the macro level data.

# Conclusions

- This paper provides several measures of the localization rate, organizes the characteristics of localization rates of main economies and studies the response of the DVARs to increasing government subsidies.
- We obtain four main conclusions,
  - First, the aggregate-level and the representative industry-level localization rates of China increase in most cases from 2005 to 2016.
  - Second, compared with economies at the similar development stage, China's dependence on foreign value-added is relatively low, and its DVARs of the final demand and exports are relatively high.
  - Third, the dependence on foreign value-added of high-income economies is not always low, and their DVARs of the final demand and exports are not always high.
  - Fourth, the empirical evidences on Chinese firm-level government subsidies and the DVARs show that SOEs reforms and marketization are two of the driving forces of increasing firms' DVARs in the past. By contrast, the effect of government subsidies on the increase in DVARs is insignificant.

# In the Future

- Extend to the discussion on “the visible hand, the invisible hand and efficiency: from the perspective of DVAR”;
  - Endogeneity Issue, propensity score method;
  - Mechanisms, the effect of government subsidies on firms’ imports and expenditures on high-quality intermediate inputs; the effect of government subsidies on firms’ markups through the cost of rent-seeking, and subsidy fraud;
  - Other government supportive policies, such as tariffs, export tax rebates and other tax incentives;
- A cross-country research on the relationship between government subsidies and their localization rates;



Thank you !

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