Assessing the gains and vulnerability of free trade: A counterfactual analysis of Macau☆

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ARTICLE INFO

ABSTRACT

Free trade can generate macroeconomic gains but also vulnerability to external shocks for a highly-specialized economy. To test this hypothesis, we evaluate the effects of Mainland-Macau Closer Economic Partnership Arrangement (CEPA) on Macau's real GDP growth rate and its volatility, as well as the costs of exposure to the anti-corruption campaign from mainland China using a counterfactual analysis. Counterfactuals of Macau are constructed by exploiting the inter-dependence among different economic entities and the optimal control group is selected with a leave-n_v-out cross-validation method. Our results support the hypothesis. CEPA raised the annual real GDP growth rate of Macau by 20.76% from 2004 to 2007, meanwhile it increased the volatility of real GDP growth rate by 35%, and the anti-corruption campaign reduced the annual real GDP growth rate by 17.54% from 2013 to 2016. Our findings imply that free trade could be a double-edged sword for a small and highly-specialized economy and the gains of free trade can be enlarged by reducing its vulnerability.

1. Introduction

Historical and recent observations raise the issue on whether international trade generates gains as well as vulnerability to external shocks for a highly-specialized economy. In the 7th century BC, Guan Zhong, China's first prime minister, used international trade to increase a target country's specialization, and exploited the resulted vulnerability as a strategy to gain control over the country[1]; Russia enjoyed rapid growth with exports of oil and natural gas, but was hit hard when oil prices plumbed and sanctions were imposed by Western countries in 2015 with a decrease of 2.83 per cent in real GDP[2]; Macau, highly relying on gaming industry, experienced rapid real-GDP growth since it signed the Closer Economic Partnership Arrangement (CEPA) with China, but saw its economy hard landed with a drop of 24.3 percent in real GDP in 2015 when China launched the anti-corruption campaign that affected the VIP market on which Macau's gaming industry highly relies.

While assessing the vulnerability of free trade is as important as evaluating its gains and practitioners heatedly debate on the topic, the issue on free trade and vulnerability remains unanswered, and is largely understated in theoretical and empirical studies (Montalbano, 2011). The development of trade theories, from inter-industry comparative advantage (Ricardo, 1951) to the "New Trade Theory" (Krugman, 1979, 1980) on intra-industry trade of differentiated products to the "New Trade Theory" (Melitz, 2003; Bernard et al., 2003; Melitz and Trefler, 2012) on firm heterogeneity, tries to explain why international trade takes place and the gains of trade. Empirical studies also have focused on the gains of free trade, e.g., Baier and Bergstrand (2007), Caporale et al. (2009), Lakatos and Walmsley (2012), and Jean et al. (2014), among

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[1] Guan Zi, written between the 6th and 7th century BC. It is on how a country lost its sovereignty because it had neglected the vulnerability of specialization-enhancing trade. The country in question produced the best swords and its people were bellicose. In order to get control over the country, Mr. Guan Zhong, doubled the market prices to purchase the country's swords. With competing purchases from other countries, the country saw the prices of swords increased by 10 fold and decided to concentrate on producing swords by even giving up farming. Meantime Mr. Guan Zhong ordered to store a large amount of food both from the target country and other countries. When the target country had abandoned farming in a large scale, he hauled all trade relations with the target country and closed all trade passages as well. The prices of swords slumped while food prices went up. The target country had no access to buy food, could not produce food within a short period of time, and had to surrender in the end.
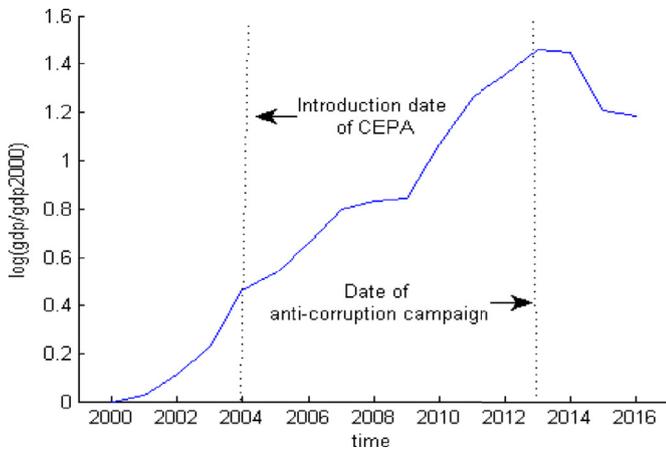[2] Data source: World Bank.

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Fig. 1. The real GDP growth rate of Macau from 2000 to 2016.

many others. Despite some attempts (Montalbano et al., 2008; Guillaumont, 2010; Naudé et al., 2009), the issue on trade openness and vulnerability remains unanswered. As pointed out by Montalbano (2011), the main challenge is that assessing vulnerability requires counterfactuals because vulnerability is an ex ante condition and is not observable.

This paper aims to contribute to the debate by evaluating the effects of CEPA on Macau's real GDP growth and its volatility, as well as the costs of exposure to the external shock of the anti-corruption campaign from mainland China using a new counterfactual analysis. The basic idea behind the method is that the economic growth of different countries and regions are often driven by some common factors, and therefore information on countries/regions not subject to CEPA/shock can help to construct the counterfactuals of Macau. This is confirmed by our real data analysis below (cf. Figs. 2–6), which show that the GDP growth rate, per capita GDP growth rate and unemployment rate of Macau before the occurrence of CEPA (anti-corruption) can be fitted very well using the data of other economy entities. Then the effect of CEPA (anti-corruption) is just the difference between what actually happened to Macau's real GDP growth rate (or per capita real GDP growth rate, unemployment rate) and the counterfactual growth rate if CEPA (anti-corruption) had not taken place. This method does not involve modelling how and why the real GDP, and unemployment have evolved over time and what factors have affected their evolution, and hence, our results are not affected by such model specifications or the choice of instrumental variables compared with the aforementioned studies.

To get a more accurate counterfactual prediction, we use the leave-n_v-out cross-validation criterion as in Du and Zhang (2015, hereafter DZ) to select the optimal control group rather than the Akaike information criterion (AIC, Akaike, 1973; 1974) and corrected Akaike information criterion (AICC, Hurvich and Tsai, 1989) used in the original method by Hsiao et al. (2012, hereafter HCW). As showed in DZ, this modified method has smaller mean squared prediction error.

The main results of the paper support the hypothesis that CEPA generates macroeconomic gains to Macau, as well as vulnerability to external shocks. Specifically, we find that from 2004 to 2007 CEPA raised the annual real GDP growth rate of Macau by 20.76%, per capita real GDP growth rate by 11.1% and reduced the unemployment rate by 1.23%. Meanwhile, CEPA increased the volatility of real GDP growth rate by 35%. The anti-corruption campaign in mainland China reduced the annual real GDP growth rate of Macau by 17.54%, and raised the unemployment rate by 0.30% from 2013 to 2016. Our findings establish that free trade could be a double-edged sword for a small and highly-specialized economy if it makes the economy even more concentrated. However, with sound macro management and diversification the gains of free trade could be enlarged by reducing its vulnerability.

This paper complements the existing literature in several ways. First, we provide a new counterfactual approach to assess the gains as well as vulnerability of free trade. The counterfactuals are constructed in an intuitive way. What would have been the economic path, had free trade or shock not occurred? This method does not need to set a benchmark to discern actual situation of vulnerability from normal variability (Alwang et al., 2001).

Second, we use a panel-data approach to exploit the inter-dependence between different economies, while the existing studies use panel data in the VAR framework. Kose et al. (2003), Hnatkovska and Loayza (2004), and Calderòn et al. (2005) use panel data to measure the impacts of openness and financial shocks. Loayza and Raddatz (2007) apply semi-structural VAR to a panel of 90 countries and show that trade openness magnifies the output impact of external shocks. Structural VAR allows to solve the simultaneous-equation bias and error terms are considered as shocks, but the problem of identification has always been its weakness. The advantage of our method is that we do not need to specify how factors affect economic growth.

Last, our study improves on Zhang et al. (2015), who use a similar counterfactual analysis to study the macroeconomic effects of the U.S.-Canada FTA on Canada. Using aggregate data, they find similar results as in Trefler (2004) who models explicitly tariff changes to study both the short-run adjustment costs and long-run gains in economic growth using firm-level data. Here we assess both the gains of free trade in economic growth and the costs in terms of economic fluctuations and exposure to external shocks.
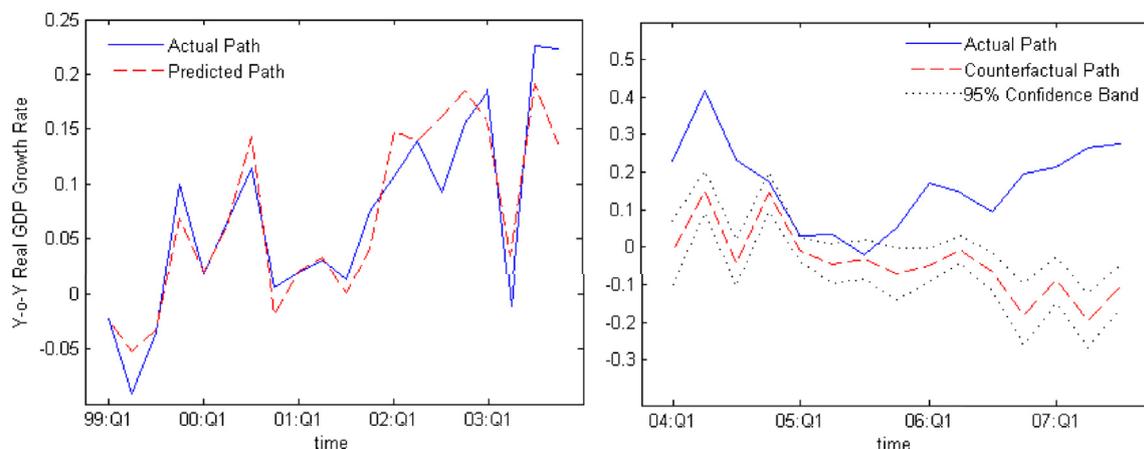

Fig. 2. Actual and predicted/counterfactual real GDP from 99:Q1 to 03:Q4 and 04:Q1 to 07:Q3.