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The impact of real exchange rate movements on firm performance: A case study of Taiwanese manufacturing firms

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Abstract

Taiwan experienced large depreciations of its currency, the New Taiwan (NT) dollar, in the late 1990s. The largest real depreciation, 13 per cent, occurred during the East Asian Financial Crisis. Since Taiwan was subjected neither to the economic turmoil of the crisis itself nor to the subsequent reforms, its experience provides a good opportunity for studying the effects of exchange rate changes on firm performance. This paper empirically examines the exchange rate effects on firm exports, domestic sales, total sales, value-added and productivity, by using data on firms listed on the Taiwan Stock Exchange merged with customs trade data covering the period of 1992–2000. Our findings indicate that the real depreciation of the NT dollar led to an increase in exports, domestic sales, total sales, value-added, and productivity. In addition, we find that the productivity improvement induced by real currency depreciation may be a result of firm scale expansion.

JEL classification: F12

Keywords: Exchange rate; Imperfect competition; Scale economies; Taiwan

1. Introduction

Substantial exchange rate movements have occurred in many developed and developing countries over the past two decades. The consequences of such major changes in exchange rates are of interest for two reasons, firstly because they may have enduring effects on international trade (Baldwin and Krugman, 1989), and secondly because such effects may be comparable to the effects of tariff reductions (Feenstra, 1989).

Examining the effects of exchange rates on productivity, Harris (2001) suggested that the depreciation of the Canadian dollar may have been a contributory factor to the widening productivity gap between Canada and the US, since it may have served to increase the costs of imported machinery and equipment, expand the innovation gap and slow down the process of creative destruction. In a study which used Canada and Australia as examples, Landon and Smith (2007) found that a negative relation existed between depreciation of the home currency against import source countries' and imports of high-technology products into these two countries.

Although incidences of substantial currency appreciation, or depreciation, have been numerous over the past 20 years, with such movements having potentially strong impacts on firm performance, surprisingly few systematic studies have been undertaken examining the ways in which large exchange rate movements can impact upon production and turnover decisions at detailed industry or microlevels.[2] At detailed industry level, the findings of Head and Ries (1999) demonstrated that the depreciation of the Canadian dollar led to an increase in the number of firms in Canada, while at microlevel, Bernard and Jensen (2004) concluded that the US exports boom in the late 1980s and early 1990s was attributable to the depreciation of the US dollar.

Forbes (2002a,b) investigated the effects that significant depreciation (devaluation) has on the output growth of a firm, as

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[2] Tybout (2000) noted that despite being a potentially important issue, particularly for developing countries, firms' responses to shocks in the macro-environment remained relatively unexplored.

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well as on other performance measures,[3] while Fung (2008) went on to explore, both theoretically and empirically, the effects of the considerable appreciation of the Taiwanese currency, the New Taiwan dollar (the NT dollar henceforth), on both firm turnover and production scale.[4]

As many countries experienced large currency depreciations or devaluations in the late 1990s, understanding the direction and magnitude of exchange rate effects on firm performance can be of great importance to policy makers. In this study, we use panel data on Taiwanese manufacturing firms to empirically investigate the impact on firm performance of the substantial real depreciation of the NT dollar. More specifically, we set out to examine the effects of depreciations on the exports, domestic sales, total sales, value-added and productivity of firms. As a case study, the advantage that an examination of Taiwanese manufacturing firms presents is that it enables us to isolate the effects of exchange rate movements. Taiwan encountered a substantial depreciation of its currency in the late 1990s. While most of the countries that faced large currency depreciations during that period have suffered from financial crisis, Taiwan was not one of the crisis countries. Thus, it did not experience the economic turmoil that beset many of its neighbors, nor did it need to adopt any of the macroeconomic reforms required by the IMF; it is therefore possible to distinguish the specific exchange rate effects. The contribution of this paper is that it provides a specific analysis of the impact of exchange rates on firm behavior. Our results demonstrate that real depreciation of the home currency has favorable effects on the exports, domestic sales, total sales, value-added and productivity of firms. In addition, the results also indicate that the positive effect on productivity of real depreciation of the home currency results from expansion of firm production scale.

This paper comprises four sections. Following on from this introduction, the next section summarizes the firm-level data used in the empirical analysis and describes the exchange rate movements. The empirical estimations are presented in Section 3. The conclusions drawn from this study are provided in Section 4.

2. Data

2.1. Firm-level data

The firm-level data used in this paper comprises data on manufacturing firms listed on the Taiwan Stock Exchange between 1991 and 2001, merged with customs data on exports and imports between 1992 and 2000. The data on annual firm balance sheets and income statements is extracted from the Taiwan Economic Journal (TEJ) database; this dataset was also used in Chen et al. (2006). The firms analyzed are in seven major industries: foods, plastics, textiles, machinery, chemicals, steel and electronics. Since the most significant currency depreciation occurred in 1997 and we are particularly interested in its impact, it is essential that we have several years of observation prior to 1997. We have therefore removed from the sample those firms that appeared after 1995.[5] The advantage of using this dataset, as compared to census or survey microdata, is that it contains data on annual exports and imports, making it possible to track changes in the exports and domestic sales of firms in response to the significant currency depreciation of 1997.[6]

Table 1a
Number of firms in selected years

Industry	1991	1994	2000
Foods	17	18	18
Plastics	13	13	14
Textiles	46	49	49
Machinery	15	17	21
Chemicals	19	20	20
Steel	13	14	14
Electronics	61	70	84
Total	184	201	220

Notes: 1. The number of employees is average from 1991 to 2000 while the exports-sales ratio is average from 1992 to 2000. 2. Exporter: the percentage of firms in the industry that report a positive value of exports. 3. The exports-sales ratio is the average among exporters.

Table 1b
Descriptive statistics

Industry	Number of employees	Exporter (per cent)	Exports-sales ratio
Foods	993.26	80.75	0.04
Plastics	632.49	100.00	0.21
Textiles	1118.26	95.17	0.35
Machinery	813.82	96.00	0.31
Chemicals	512.05	80.90	0.21
Steel	516.39	96.80	0.23
Electronics	1080.18	100.00	0.51
Overall	937.00	94.90	0.36

Notes: 1. The number of employees is average from 1991 to 2000 while the exports-sales ratio is average from 1992 to 2000. 2. Exporter: the percentage of firms in the industry that report a positive value of exports. 3. The exports-sales ratio is the average among exporters.

The total numbers of firms in 1991, 1994 and 2000 are summarized in Table 1a, while the average number of employees, the percentage of exporting firms and the exports-sales ratios are reported in Table 1b. There were steady increases in the total number of firms, from 184 in 1991 to 201 in 1994, and still further, to 220, in 2000, a time when approximately 40 per cent of the firms were in the electronics industry, the most rapidly growing industry in Taiwan. The average number of employees per firm ranged from around 512 in the chemicals industry to 1118 in the textiles industry. On average, approximately 95 per cent of the firms were exporters; and all firms in the plastics and electronics industries were participating in the export market.

[3] The performance measures used by Forbes (2002b) were sales, net income, market capitalization and assets.

[4] The empirical analysis of Fung (2008) was carried out using the 1986, 1991 and 1996 census data; there are, therefore, only three data points per firm.

[5] Refer to Appendix A for details.

[6] The Industry, Commerce, and Service census reports exports data since 1986 but it is conducted every 5 years. The plant-level survey is conducted every year (except the census years) but exports data are not available every year.