THE PENNSYLVANIA STATE UNIVERSITY SCHREYER HONORS COLLEGE

DEPARTMENT OF ACCOUNTING

VARIABLE COSTING THEORY: USEFUL MANAGERIAL TOOL OR PARIAH OF THE WORLD? THE CASE OF CHINA

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A thesis submitted in partial fulfillment of the requirements for baccalaureate degrees in Accounting and Finance with honors in Accounting

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ABSTRACT

Over the last 20 years, the world witnessed the rise of China as a leader in product manufacturing and exports. Because China has priced goods lower than other countries, allegations of 'dumping' or selling at artificially lower costs to gain market share have been raised. It is widely recognized that China has experienced a cost advantage with regard to labor costs, but recently, even India claimed that China has underpriced them, which also share low labor costs.

This phenomenon that China can price their products lower than other countries makes the allegations of dumping appear valid, but also raises questions of other potentially legitimate causes. This thesis examines research which provides reasons that could explain China's cost advantages. Based on this research, differences between accounting for product costs using U.S. GAAP absorption costing and what appears to be the Chinese adoption of a variable costing contribution margin approach is presented. This analysis is then supported by the development of an Isoprofit Curve to examine different levels of cost and profit using a marginal cost approach.

In conclusion, the Western world has based their premise that the only valid product cost is derived on the assumption of absorption costing. However, the findings of this research challenge that premise and posit that China's use of variable costing may not only be the reason for their ability to cost their products for less than those of other countries, but may be an appropriate and valid alternative for product costing.

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Chapter 1

Introduction

Since the declaration of the new 'open door policy' by Deng Xiaoping in 1978, China has become the fastest growing economy and the manufacturer of the world ("Inside China's Ruling Party). As a result, over the period from 1981 to 2011, the Peoples' Republic of China (PRC) saw an increase in their percentage of global merchandise exports from 1.09% to 10.40% (World Trade Organization). According to the World Trade Organization (WTO), this share of the world market makes China the world leader with exports exceeding \$1.5 trillion. This impressive growth fueled by the low cost of production in China has resulted in its undeniable dominance in the global trade of manufactured goods.

Planning is central to the functioning of a command economy, a strategy employed by the PRC as early as 1953 when they announced their first 'Five Year Plan.' These plans outline the state-endorsed goals for economic and social development during the upcoming five year period and provide evidence of the PRC's preoccupation to pursue dominance in many areas, including trade.

In their sixth 'Five Year Plan' covering the period of 1981 to 1985, more than half of the stated goals stressed the importance of industrial production, foreign investment and trade; or to use the PRC's words, to "strenuously develop trade, make effective use

of foreign capital and actively introduce advanced technology to meet domestic needs" (Sixth Five Year Plan). Over the period covered by this plan, China experienced a growth of 10% in GNP and rose to '#10' in the world for foreign trade and technological exchange from their '#28' position in 1980 (China.org.cn). Similar endorsements for continuing this policy of export-led growth can be found in the PRC's seventh (1986 to 1990) and eighth (1991 to 1996) Five Year Plans.

This focus on export-led growth has, in fact, been reaffirmed in their latest plan, naming foreign investment and high-end manufacturing as major goals, resulting in surpassing the United States as the world leader in foreign direct investment since 2003 (Galloway, 2012). This commitment to the expansion of trade in the period following the 'open door policy' has been internalized by their population and has contributed to the dominance of the PRC in the global economy.

In the context of recent stagnant growth in the developed world, the remarkable growth of China exports has raised suspicions about its pricing policies. Since joining the WTO in December 2001, the PRC has faced numerous allegations of 'dumping' their exports in foreign markets. Dumping refers to a pricing policy in which the exporting country prices its goods well below the importing country's market prices. The exporting company expects domestic firms in the importing country to fail by being underpriced. In theory, the foreign country could then use its relative monopoly to raise market prices in the long-run. The practice of dumping carries the potential of being detrimental to the global market, and thus not condoned by the WTO.

The relative price advantage of the PRC over developed countries, such as the United States, and those of Western Europe, could be defended, by the argument that a developing country has significantly cheaper factor prices, most importantly labor. Yet, interestingly, the allegations of dumping extend beyond these members of the developed world. In 2009, the Indian government has stated that Chinese imports were priced between 10 and 70 per cent less than comparable Indian products, representing a price differential that is "huge and difficult to explain." (Thoma) Following India's claim, the narrative of cheap labor no longer appeared as a sufficient explanation for the dominance of the PRC.

Many reasons have since been advanced to explain the PRC price differential relative to the global markets. These reasons range from tax subsidies and wage arbitrage opportunities, to the differing methodologies of cost classification driving their financial reporting and decision-making abilities. The main objective of this study is to identify the extent to which the prices of Chinese goods reflect in the manner in which product costs are accounted for.

This paper first outlines six explanations for the PRC's emergence as the manufacturer of the world in Chapter 2. Of these many explanations, attention is focused on the practice of product cost classification in the context of a national policy of exportled growth. Chapter 3 aggregates research on the practices of Chinese cost classifications and provides support for Chinese manufacturers using variable costing approaches.

Moreover, it argues that a policy of export-led growth fosters a business environment in which Chinese manufacturers can rationally price at close to variable costs. Specifically, if state sponsored export subsidies are close to the fixed manufacturing costs, then the latter can be treated as irrelevant to the pricing decision. Since there is no unambiguous measure of true costs, the WTO and related allegations of dumping are rendered questionable. In the conclusion, I contend that an exclusive reliance on GAAP for decision-making by managers could have contributed to the phenomenon of offshoring on the one hand and the dominance of Chinese in the global trade of manufactured goods.

Chapter 2

Literature Review

Observable in the macro-economic environment is a situation in which Chinese firms can manufacture and price goods below other countries. This could reflect the pursuit of a high volume-low cost economic strategy. Several factors for PRC manufacturers have incentivized such a phenomenon and are presented below.

The most commonly cited reason giving Chinese companies a comparative advantage in manufacturing is their low labor costs relative to those in the developed world. Yet, Lawson's data suggests that surveyed company's labor costs make up only around 15% of their total costs. It is probable that savings in this area would have some effect on both the total cost of a product and the corresponding pricing decision.

However, Fishman writes, "many offshoring decisions were based on a single preoccupation- cheap labor." These firms have returned to domestic manufacturing, a phenomenon coined by Fishman as the Insourcing Boom, citing reasons of higher costs of transportation and managing long distance relations cannibalizing gains realized on labor. Although lower wage rates could partially explain the relative advantage that China has with regard to Western manufacturers, it does not explain the advantages to India, described above, which has comparable labor conditions.

Another reason that may explain the differences in costs is that China is a former Communist country and shaped many of their accounting systems based on Russian models. In a Communist country, the central government controls many of the factors of production and many of the costs that are borne by companies in other economic models do not exist for these manufacturers. For example, Chinese firms cannot own land but rather must lease it from the government. Absent a free market in land, it is likely that such costs even when captured in lease payments could be less than 'normal' asset values and correspondingly reduce product costs.

As against national export incentives are local protectionism policies in the PRC. Within the Chinese borders, trade barriers exist between different provinces. In order to enter any of these markets, it is conventional for Chinese companies to pay grey costs to compensate provinces for their encroachment. Such a practice incentivizes firms to look beyond the borders of the PRC.

There is also the issue that China's currency is undervalued which has given them a competitive advantage over other economies. "From 1995 to 2005, China pegged its currency, holding it steady at slightly over eight yuan to the dollar" (Lazear). As of 2010, CNN reports, "Some economists think the yuan is undervalued by 20% or more." Having an undervalued currency makes goods cheaper artificially due to the currency valuation and not necessarily due to comparative advantages in processes or labor factors.

Export subsidies provide another possibility for differences in costs. The general tax rebate rate of China's exported commodities is 13.5 percent while a 17 percent value-added tax is levied when they are sold in domestic markets. Chinese exports are highly subsidized by the government, which has given them the ability to charge low prices for foreign sales.

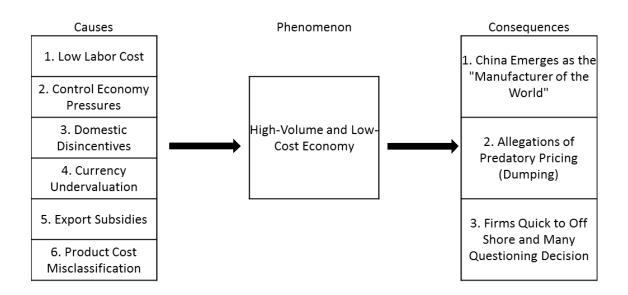
Lawson's research advances a holistic explanation for the lower costs of Chinese products. Specifically, he points to the divergence between the Chinese and Western practice of classifying product costs. Lawson reports that a majority of surveyed Chinese companies classify fringe benefits related to direct labor costs as Selling, General and Administrative (SG&A) expenses, which differs from the Western practice of including such benefits in direct labor. The surveyed companies also claimed to classify as period costs, some indirect production-related costs (overhead costs) including the costs of supervision and management of production facilities. Here again, this practice is markedly different from the Western treatment of including these manufacturing overhead costs within product costs. Lawson also observes that Chinese companies do not use standard costs or predetermined rates to allocate the overhead costs, instead they allocate overhead based on actual costs. In addition, all variances are closed directly into Cost of Goods Sold (COGS), which avoids including them in any inventoriable product costs which also has the effect of large fluctuation in product costs (Lawson). Consequently, these classification differences would result in lower Chinese product costs.

Each of these six factors identified above could partially or wholly explain how China has been able to price their products for less than other countries. This phenomenon observed by the international markets has then resulted in actions taken by U.S. and other Western companies. These causes and resulting consequences are shown in Exhibit 1.

EXHIBIT 1:

Analysis of the Causes and Consequences of Factors Explaining Differences in

Chinese Product Costs



Chapter 3

Argument

Among these six causes for the emergence of a high volume and low cost economy recognized in the literature, the differing practices of product cost classifications have perhaps the most staggering implication for accountants. Over the past twenty years, China has been a popular topic for international accounting research, primarily examining differences between accounting practices in the PRC and the international standards. Catalyzed by Lawson's findings, I examined the international accounting literature on Chinese accounting since the 'open-door' policy to discover therein a consistent theme of differing product cost classifications. An analysis of the data presented in that suggests strongly that the reported Chinese *Gross Margin* is closer to the Western accounting concept of *Contribution Margin*.

The discipline of accounting has enjoyed a lengthy and storied presence in China, that rivals the period of its civilization. "However, its function has always been bookkeeping, serving as a memorandum for the enterprise owners – the emperor of the state." (Lefebvre & Lin)

Following the 'open door' declaration, the PRC saw a dramatic shift in both the ownership structures and functions of business entities. Lefebvre and Lin state, "Between 1978 and 1987, the state-owned proportion of the industrial economy of the industrial

economy dropped from 80% to 69% while the semi-state-owned, semi-private-owned "commercial sector" grew from 19.8% to 29%, and the private sector from 0.2% to 2%" (Lefebvre & Lin). Additionally, Bromwich and Wang note, "a number of profit-sharing schemes, which sought to motivate enterprises by encouraging the interest of the enterprise and its employees in the profits it generated, were introduced in succession starting in 1979," many of which were "... highly effective in changing the goals of enterprises." These early deviations from a centralized planned structure towards a more market-based economy were implemented widely, and the historic function of accounting as mere bookkeeping proved insufficient.

Perhaps unknowingly, accountants assumed heightened responsibilities for reporting financial information beyond the scope of internal government use. In a new way, these responsibilities extended to supporting decision-making at the management level. As Lefebvre and Lin assert emphatically, since "the financial reports regulated by the state Ministry of Finance fail(ed) significantly in meeting the needs of other report users" it comes as little surprise that "practitioners actually began to use some Western management accounting techniques in their work from the beginning of 1980s to meet the new decision-making role required of accounting by management" (Bromwich & Wang).

Specifically, Bromwich and Wang discovered that "Cost-volume-profit (CVP) analysis was of special interest to both academics and practitioners in China because of its ability to link target profit with operational planning." This managerial tool proved to

be useful for the new expanded role of accountants for as Bromwich and Wang suggested, "Chinese accountants claimed that by using contribution margin analysis and CVP analysis they could provide management with valuable suggestions for increasing profit, which had become an important management objective."

Bromwich and Wang continue that this early inculcation of Chinese accountants after the open-door policy to CVP analysis helped dispel erroneous beliefs on pricing below full cost, stating that in such situations "'the higher the volume, the greater the loss' was previously taken for granted by many Chinese accountants and managers." This implies that when they became familiar with the concept of contribution margin, it became the driver of profits. Rather than follow the conventions of GAAP for costing a product, it can be reasonably surmised that accountants schooled to CVP analysis would use variable production costs as a measure of product costs. This would be more likely in the context of a national policy tuned to economic growth through low cost exports. As standard CVP analysis shows, as long as the volume of sales is sufficiently large, a selling price over variable costs of production would still generate profits

Numerous authors have catalogued the differences between Chinese and Western practices of accounting for product costs. These differences are presented in Exhibit 2, which provides a list of items that are normally included in the cost of manufacturing a product. These items are summarized according to typical product cost classifications and provide some detailed components for each category of cost. For each category, the Exhibit presents whether the item is included in the product cost according to Western

and Chinese practices. In addition, the relevant literature from which the information was obtained is indicated.

EXHIBIT 2: Differences between Western and Chinese Product Cost Components

Product cost com	ponents
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	Western Practice	Chinese Practice	Source
Direct Materials		Tructice	Bource
Material Costs	Included	Included	Lawson
Procurement Costs	Included	Included	Lawson

Direct Labor

Wages	Included	Included	Lawson
Fringe Benefits	Included	Not Included	Lawson

Variable Manufacturing Overhead

Overtime premium	Included	No guidance	
Utilities	Included	Included	Lawson
Manufacturing supervision	Included	Included	Lawson
Sales Tax	Included	Included	Lefebvre and Lin
Low value and short-lived articles	Included	Included or Excluded	Lefebvre and Lin

Fixed Manufacturing Overhead

Rent (Cost of leases)	Included	Not Included, period cost	Fang and Tang
Maintenance	Included	No guidance	
Insurance	Included	No guidance	
Depreciation	Included	Included, no accelerated method	Lefebvre and Lin

Selling & administrative expenses

Enterprise administrative expenses	Not included	Included	Lefebvre and Lin
Selling expenses	Not included	Included	Lefebvre and Lin
Interest portion of loans	Not Included	Included	Lefebvre and Lin

Inspecting this exhibit, two distinct types of differences can be seen to exist. First, the omissions of components mandated to be included by western practice, and inclusions of components that are excluded from product costs in the West. These presentation differences not only adversely affect the comparability of PRC financial reports and GAAP reports but also equally suggest that product costs and consequently product pricing would be markedly lower under PRC rules.

Specifically, there are two notable omissions in the Chinese calculation of product cost: fringe benefits related to labor and the cost of leases. The fringe benefits would be designated as direct labor and included in the manufacturing costs in Western practice. However, Lawson references the 2001 Chinese Accounting Regulations, which requires the inclusion of fringe benefits as a period expense and not a production cost. These mandates were superseded with the 2006 CAS and now require that fringe benefits related to labor, be included in product costs.

The other issue of omission relates to expensing land-use rights as opposed to amortizing them over their useful life. In conformance with Western standards, Fang and Tang assert that these land-use rights should be "amortized during the contractual period" (Fang & Tang). However, in his fieldwork, Lawson discovered that "Only 7.8% of the surveyed companies include the amortization of land use rights in manufacturing overhead and allocate it to products" (Lawson).

The omission of the fringe benefits in direct labor costs and the amortization of

the land use costs would result in product costs that are materially different than those produced by Western accounting practices. The end result would be a product cost that is lower and which, if relied on to establish prices, would give Chinese companies a legitimate pricing advantage over their Western counterparts.

There are three notable inclusions in the Chinese computation of product cost, which are excluded in the Western principles. Lefebvre and Lin documented these differences in the Chinese equivalent of the income statement. Specific items include "selling expenses (which) are deducted from sales revenue before the operating margin is calculated. The account "profit from sales of product" is (thus) not equal to "operating margin"...Moreover, the cost of product sold includes enterprise administrative expenses as well as workshop expenses. These expenses are not considered as period expenses but as product cost. So they are deducted from the sales margin" (Lefebvre & Lin). Additionally, they report "Interest expenses are included in the product cost as an item of enterprise administrative expenses and are not included in non-operating expenses." (Lefebvre & Lin) These differences would increase product costs of Chinese goods when compared to those measured by GAAP rules. Chinese managers deciding on prices as function of product costs would therefore price products higher than managers using GAAP based product costs. Whether or not the overall product costs under the Chines measurement rules are lower than those under GAAP therefore depends on the relative size of these offsetting cost classifications.

The nature of these divergences in costing practices, validated by relevant literature, brings the Chinese production cost and gross margin values closer to the Western notions of variable cost and contribution margin, respectively. For example the inclusion of sales and administrative expenses into costing is almost exclusively limited to variable costs. Also the relevant literature reports that the Chinese firms exclude costs, which appear fixed in nature consistently, specifically cost of leases and fringe benefits.

Assuming that the variable selling and administrative costs do not exceed the fixed manufacturing overhead costs in the same firm, the variable cost per unit will necessarily be less than the absorption full cost. To some degree, these differences in the measuring and accounting of product cost, may have contributed to the phenomenon of China pursuing a low cost high volume economy. Even if the pricing decision is based on a number of factors of which product cost is only one, it is clear that the contribution margin approach to product costing is neither a misclassification nor an erroneous method. Rather, given a certain strategy of export led growth (where under-recovery of fixed costs are covered by export subsidies), it can be argued as entirely legitimate to price products using their variable costs as the baseline. This pricing strategy could also explain why Chinese products are cheaper than say other low labor cost countries like India, which follow full absorption measurements of cost products.

To better calibrate the offsetting consequences of these divergent classifying practices on product costs, exhibit 3 approximates product cost under different costing methodologies, specifically Absorption 'Full Costing', Chinese, and Variable, drawing

from the classification differences presented in Exhibit 2 and the export subsidy referenced in Chapter 2. The total percentages related to Direct Labor, 15%, and Manufacturing Overhead, 15%, are inferred directly from Lawson's data, while all other percentages have been created under reasonable assumptions following the suggestions in Zimmerman's *Accounting for Decision Making and Control*, Seventh Edition.

EXHIBIT 3: Product Cost Approximations Under Differing Methodologies

		Product C	ost Approxii	nations
	Percentage of Total Cost	"Absorption"	"Chinese"	"Variable"
Direct Materials	40.00%	40.00%	40.00%	40.00%
Direct Labor Fringe Benefits	9.00%	9.00%	5 000/	5.0007
Wages	6.00%	6.00%	6.00%	6.00%
Variable Manufacturing Overhead	7.50%	7.50%	7.50%	7.50%
Fixed Manufacturing Overhead (Land Use Rights)	7.50%	7.50%		
Variable SG&A	5.00%		5.00%	5.00%
Fixed SG&A	5.00%		5.00%	
Interest & Taxes				
Interest	5.00%		5.00%	
Taxes	15.00%			
Less: Chinese Export Subsidy			-13.50%	
Total	100.00%	70.00%	55.00%	58.50%

Exhibit 3 indicates that accounting for the differing classifications of costs and netting out the benefit from state-sponsored export growth, the approximated "Chinese"

product cost approaches the measure of variable product cost. It is of particular interest that the total amount of fixed costs is very close to the export subsidy. By reducing the conservative approximation of total fixed costs (12.50%) by the lowest Chinese export subsidy (13.50%), it appears evident that in an effort to incentivize export-led growth, the PRC has created an environment of making fixed costs irrelevant to the pricing decision of its manufacturers. Under this environment of irrelevant fixed costs, let us examine the rational strategy for various market participants.

Consider two competing firms manufacturing a homogenous product, currently priced at \$20.00 and considering a price drop. Both firms have Variable Costs of \$5.00 and Fixed Costs of \$50.00 and wish to realize a target profit of \$20.00, ignoring taxes. The decision becomes a function of Price of the product and the required Volume needed to sell to earn the target profit. This relationship between Price and Volume, to attain a single target profit level is known as an isoprofit curve and is presented in Exhibit 4.

EXHIBIT 4:

Isoprofit Curve A (4.67, \$20) \$20.00 \$18.00 B (7.78, \$14) \$14.00 \$12.00 C (14.00, \$10) \$10.00 \$8.00 \$6.00 5.00 10.00 15.00 20.00 25.00 Volume

EXHIBIT 5: Relationship of the Change in Price to the Change in Volume of the Isoprofit Curve

Δ Price %	Δ Volume %
-10%	15%
-15%	25%
-20%	36%
-30%	67%
-40%	114%
-50%	200%
-55%	250%
-58%	333%
-61%	500%
-65%	1000%

Under the conditions stated in the preceding paragraph, neither firm would attempt to move from Point A to Point B or Point C because of the absurd expectations of raising the volume of sales by 67% to move to Point B and by 200% to reach Point C, as indicated by Exhibit 5. The isoprofit curves shows that reducing price by 50% increases the required volume by 200%. However, if one of the firms has an arrangement in which its fixed costs are reimbursed and directed to increase production, that firm may rationally be willing to price their variable costs, or equivalently, use positive contribution margin as the metric to determine prices. They would have no fixed overhead amounts to cover and hence insolvency would not be a concern. Thus this firm could rationally pursue a low-cost high-volume strategy. Paradoxically, in a command economy with export subsidies equal to the total capacity related costs, the rational pricing policy is closer to the theoretical free market price where marginal revenue equals marginal cost in contrast to full costing pricing.

Chapter 4

Conclusion

After this close inspection of Chinese product costs and noting the differences between these and product costs calculated using U.S. GAAP, it would appear that the differences may not be as great as first posited. It may be as basic that the true differences lie in the definition of cost behavior and whether costs normally classified as part of inventoriable product costs are instead treated as period costs. Therefore, the comparative advantage of Chinese manufacturers to some degree is just a matter of measurement and its influence on pricing decisions.

Our frame of reference has made us believe that U.S. GAAP and the use of absorption costing provides the best measure of product cost. However, it is possible that this emphasis on financial reporting and U.S. GAAP may result in distorted costs and poor managerial pricing decisions. Since we do not know what the definition is of "true" product cost, there is no reason to believe that U.S. GAAP provides the most accurate measure and reliance on this cost basis may partly just reflect our historical conventions. With this mindset, the premise of Chinese dumping allegations, simply because they significantly underprice competitors, are invalidated. In fact, given the incentives, in the form of export subsidies, substantially covering fixed cost expenditures, the variable costing strategy would be rational and correct. An important lesson which may be learned during the previous decades' outsourcing exodus is that the mandatory accounting

practices of the West overreached their original purpose, and have handicapped subscribing companies. These findings suggest one more reason to reduce emphasis on GAAP for manager's pricing decisions.

To further this research, it would be useful to examine product cost information actually incurred by manufacturers in China. This data could be used to examine potential differences in Western accounting practices for product costing and those that appear to be used in China. This analysis could provide evidence as to whether China has adopted a variable costing system and could revolutionize how the world approaches product costing.

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