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The End of Multi-Fibre Arrangement and Firm Performance in the Textile Industry: New Evidence

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Using a sample of 321 textile and clothing companies for the years 1992 to 2010, this paper analyses the effect of quota phase-outs on firm-level efficiency in Pakistan following the end of the Multi-Fibre Arrangement (MFA). It highlights sectoral heterogeneity within the manufacturing industry as a result of MFA expiration. The empirical methodology uses the structural techniques proposed by Olley and Pakes (1996), and Levinsohn and Petrin (2003) in order to take care of endogeneity in the estimation of production functions. The results differ for the two industries: MFA expiration lead to an increase in the average productivity of textile producing firms but a significant reduction in the mean productivity of clothing producers. We offer a number of explanations for this outcome, such as a change in the input and product mix, entry by non-exporters in the clothing sector, and sectoral differences in quality ladders. A number of crucial policy lessons can be drawn from the findings of this study.

JEL Classification: F13; F14; D24; C14; O19

Keywords: Multi-Fibre Arrangement, Trade Liberalisation, Productivity, Firm Heterogeneity, Simultaneity and Production Functions, Endogeneity of Protection

1. INTRODUCTION

The Multi-Fibre Arrangement (MFA) was the outcome of a decade-and-a-half of previous short-term agreements on the trade of textile and clothing (T&C) products amongst the developed and developing countries. Signed in 1974, the MFA enforced restrictions on exports by T&C exporters to developed countries by means of bilaterally negotiated quotas on textile products. Moreover, T&C products were excluded from multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT) and the World Trade Organisation (WTO). An important development of the

Uruguay Round (1994) was signing of the Agreement on Textile and Clothing (ATC) which put to an end the MFA. The ATC commenced the practice of integrating T&C products into GATT/WTO. The integration occurred over a period of ten years and across four phases starting from 1 January 1995. Importing countries were to include a certain portion of all T&C products covered by the ATC in each phase.[1] The expiration of these quotas was expected to bring about a considerable reallocation of production and exports across countries. This paper evaluates the impact of the end of MFA on Pakistan's T &C industry under the ATC. More specifically, it evaluates the impact of quota relaxation and removal on firm productivity and total output in these industries. The goal of the study is to use the adjusted quota base within a given industry on the right-hand side of a regression with either firm productivity or firm output as the dependent variable. The paper argues that the quota changes can be seen as exogenous from the firm's perspective. Naturally, the topic is of general interest as well as from Pakistan's point of view. The T&C industries are important in many developing countries, including Pakistan, and the ATC was one of the most important negotiated trade reforms for developing countries in the past 30 years. The end of quota system, together with the mounting significance of the industry in its domestic market, leads us to analyse the efficiency issues related to Pakistan's textile industry.

What is of interest in the paper is the central issue of the relationship between these quota phase-outs and firm output and productivity. Unlike most other studies in the literature, this paper investigates the liberalisation episode in a developed country, i.e. the United States in our case, and its consequences for firms in Pakistan. Furthermore, it highlights sectoral heterogeneity within the manufacturing industry of a developing country as an effect of MFA expiration. The textile sector is an important industry in Pakistan in terms of output, export value, foreign exchange earnings and employment.[2] Tables 1 and 2 demonstrate the export value in millions of U.S. dollars of several cotton and cotton manufactures from 1993 to 2011. Pakistan is the fourth largest producer of cotton in the world and does not have to rely on other countries for its raw materials. Moreover, labour costs in Pakistan are among the lowest in the world.[3] T&C make up roughly 74 percent of total export value. Tables 3 and 4 show the production and export of yarn and cloth, respectively, from 1971 to 1991. Government had taken steps to ensure competitiveness of its product even prior to the MFA expiration.[4]

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[1]The particular products integrated in each phase were specific to importing countries but were determined by two rules [Brambilla, *et al.* (2007)]. To begin with, the products retired in each phase had to consist of goods from all four key textile and clothing segments: Yarn, Fabrics, Made-Up textile products, and Clothing. Moreover, the selected products had to correspond to an agreed fraction of each country's 1990 T&C imports by volume. The U.S. postponed the removal of quotas on sensitive products until Phase III. Of the 4,839 ten-digit Harmonized System (HS) product codes that the U.S. retired over the four phases, 62 percent were retired in 2005. HS codes are the group of T&C products governed by the ATC and imported by the U.S.

[2]The spinning sector was the most privileged by investment. It received 47 percent of the $4 billion investment in the T&C industry between 1999 and 2003. After China and India, Pakistan has the third-largest capacity of short-staple spindles for spun yarn in the world ("Textiles and Apparel: Assessment of the Competitiveness of Certain Foreign Suppliers to the U.S. Market." Investigation No. 332-448, U.S. International Trade Commission, 2004).

[3][International Comparison of the Hourly Labour Cost in the Primary Textile Industry (2012)].

[4]The private and public sectors together formed the National Textile Institute (Faisalabad) in 1959. The government proposed Textile Vision 2005, which involves giving loans to upgrade equipment, interest rate and tax policy reforms, and promotion of product and market diversification.

Table 1

Exports of Cotton and Cotton Manufactures in Millions of US Dollars

Period	Cotton Yarn	Cotton Cloth	Tent and Canvas	Cotton Bags	Towels	Bed Wear
1993-94	1259.3	820.6	29.1	17.3	129.2	285.6
1994-95	1528.1	1081.4	38.2	19.1	144.8	340.2
1995-96	1540.3	1275.9	39.5	24.6	174.1	422.2
1996-97	1411.5	1262.4	36.2	27.6	194.1	456.3
1997-98	1159.5	1250.3	58.1	23.1	200.1	508.8
1998-99	945.2	1115.2	40.8	20.8	177.7	611.0
1999-00	1071.6	1096.2	52.9	19.2	195.6	709.9
2000-01	1076.6	1035.0	50.0	19.0	243.0	734.9
2001-02	942.3	1132.7	47.4	18.2	269.8	918.5
2002-03	928.3	1345.6	73.2	18.2	374.8	1329.0
2003-04	1127.0	1711.7	75	18.0	404	1383
2004-05	1057.0	1863	67	0	520	1450
2005-06	1383.0	2108.0	39.0	13.7	588.0	2038.0
2006-07	1428.0	2027.0	69.0	11.4	611.0	1996.0
2007-08	1,301.0	2,011	71.0	10.4	613.0	1904.0
2008-09	1114.8	1955.3	56.2	8.4	642.9	1735.0
2009-10	1,433.1	1,800.1	61.5	5.3	668.2	1,744.3
2010-11	2,201.4	2,623.2	47.0	10.3	762.3	2,088.9

Source: All Pakistan Textile Mills Association (APTMA).

Table 2

Exports of Cotton and Cotton Manufactures in Millions of US Dollars

Period	Other Made-ups	Garments	Hosiery	Thread	Cotton Manufacture	Total Export
1993-94	129.4	612.2	509.1	4.0	3795.8	6802.5
1994-95	163.5	641.7	688.5	1.9	4647.5	8137.2
1995-96	179.1	648.5	703.4	1.5	5009.1	8707.1
1996-97	208.7	736.4	688.9	1.7	5023.8	8320.3
1997-98	245.8	746.5	696.7	1.8	4890.7	8627.7
1998-99	255.3	651.2	742.1	1.5	4560.8	7779.3
1999-00	307.6	771.7	886.7	1.3	5112.7	8568.6
2000-01	328.2	827.5	910.3	1.0	5225.5	9224.7
2001-02	351.3	882	841.5	–	5404	9123.6
2002-03	359.7	1092.6	1146.6	–	6668.0	11160.2
2003-04	417.0	993	1459	–	7587.7	1231.3.
2004-05	466	1088	1635	0	8146	14391.0
2005-06	418.0	1310	1751	0.3	9649	16451.0
2006-07	514.0	1547.0	1798.0	0.2	10001.6	16976.0
2007-08	537.0	1452.0	1732.3	0.2	9631.9	19052.0
2008-09	480.1	1230.0	1740.8	–	8963.5	17688.0
2009-10	537.2	1,269.3	1,744.3	–	9,263.3	19,290.0
2010-11	625.0	1,773.7	2,305.6	–	12,437.2	24,810.4

Source: All Pakistan Textile Mills Association (APTMA).

Table 3

Production and Export of Yarn in Thousands of Kilograms (1971–1991)

| Year | Production | Exports | | Year | Production | Exports | |
		Quantity	% of Production			Quantity	% of Production
1971-72	335,702	130,158	38.77	1991-92	1,188,270	505,863	42.57
1972-73	376,122	184,404	49.03	1992-93	1,234,539	555,294	44.98
1973-74	379,460	100,564	26.50	1993-94	1,498,948	578,648	38.60
1974-75	351,200	78,365	22.31	1994-95	1,413,648	522,091	36.93
1975-76	349,653	112,182	32.08	1995-96	1,505,244	535,889	35.60
1976-77	282,640	64,294	22.75	1996-97	1,530,855	508,188	33.20
1977-78	297,895	59,955	20.13	1997-98	1,540,720	461,919	29.98
1978-79	327,796	97,929	29.87	1998-99	1,547,632	421,481	27.23
1979-80	362,862	99,834	27.51	1999-00	1,678,536	512,971	30.56
1980-81	374,947	95,232	25.40	2000-01	1,729,129	545,134	31.59
1981-82	430,154	95,621	22.23	2001-02	1,818,345	539,500	29.67
1982-83	448,430	134,100	29.90	2002-03	1,924,936	525,130	27.28
1983-84	431,580	101,805	23.59	2003-04	1,938,908	514,279	26.52
1984-85	431,731	125,855	29.15	2004-05	2,290,340	520,782	22.74
1985-86	482,186	157,895	32.75	2005-06	2,216,605	691,492	31.20
1986-87	586,371	259,668	44.28	2006-07	2,727,566	699,259	25.64
1987-88	685,031	210,950	30.79	2007-08	2,809,383	594,936	21.18
1988-89	767,434	291,953	38.04	2008-09	2,862,411	526,246	18.38
1989-90	925,382	374,976	40.52	2009-10	2,880,970	612,413	21.26
1990-91	1,055,228	501,072	47.48	2010-11	3,016,972	549,947	18.23

Source: All Pakistan Textile Mills Association (APTMA).

Table 4

Production and Export of Cloth in Million Square Meters (1971–1991)

| Year | Production | Exports | | Year | Production | Exports | |
		Quantity	% of Production			Quantity	% of Production
1971-72	1350.67	409.81	30.34	1991-92	3238.99	1196.12	36.93
1972-73	1238.11	517.98	41.84	1992-93	3360.00	1127.58	33.56
1973-74	1828.72	353.02	19.30	1993-94	3378.00	1046.79	30.99
1974-75	1827.08	440.81	24.13	1994-95	3100.75	1160.66	37.43
1975-76	1503.36	463.84	30.85	1995-96	3706.00	1323.09	35.70
1976-77	1445.30	416.84	28.84	1996-97	3781.20	1257.43	33.25
1977-78	1573.07	453.47	28.83	1997-98	3913.70	1271.27	32.48
1978-79	1487.10	531.53	35.74	1998-99	4386.79	1355.17	30.89
1979-80	1720.02	545.77	31.73	1999-00	4987.16	1574.88	31.58
1980-81	1834.00	500.90	27.31	2000-01	5591.40	1736.00	31.05
1981-82	2200.44	584.35	26.56	2001-02	5653.09	1957.35	34.62
1982-83	2048.77	605.33	29.55	2002-03	5650.52	2005.38	35.49
1983-84	2165.98	664.38	30.67	2003-04	6833.12	2412.87	35.31
1984-85	2000.00	687.62	34.38	2004-05	6480.67	2751.56	42.46
1985-86	1985.40	727.35	36.63	2005-06	8524.26	2633.98	30.90
1986-87	2009.85	693.42	34.50	2006-07	8694.92	2211.84	25.44
1987-88	2230.82	848.61	38.04	2007-08	9005.44	2035.14	22.60
1988-89	2250.00	845.33	37.57	2008-09	9015.26	1898.54	21.06
1989-90	2734.77	1017.87	37.22	2009-10	8949.77	1753.12	19.59
1990-91	2854.00	1056.53	37.02	2010-11	9018.32	2297.49	25.48

Source: All Pakistan Textile Mills Association (APTMA).

**Fig. 1. Mean Productivity of Textile and Clothing Firms—Levinsohn and
Petrin Productivity Measure**
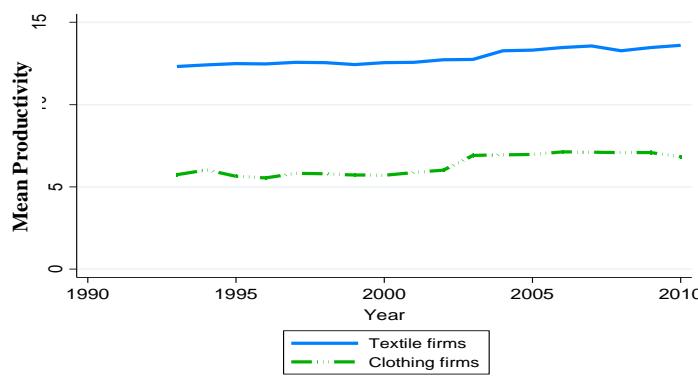
Figure 1 shows the evolution of mean productivity of the sample of T&C firms used in the paper. It is computed using Levinsohn and Petrin productivity measure (which we explain later in the paper). For the time period under consideration, textile firms have a much higher mean productivity than clothing firms. Furthermore, we notice an upward trend in the mean productivity of both types of firms. The focus of this paper is on the exports of T&C products by Pakistan to the U.S. only. The reason why this is an interesting case to consider is because the United States is the most important trading partner of Pakistan for a sizeable majority of T&C products. In fact, for most of the clothing products exported, the U.S. captures more than 90 percent of total market share.[5] Moreover, the fill rates for nearly all T&C products are very close to one hundred, indicating that quotas imposed by the U.S. were usually binding.[6]

Fig. 2. Level of Imports and Adjusted Quota Base (Examples)
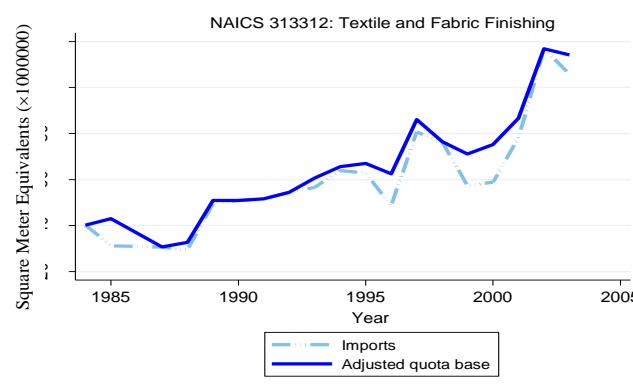
[5]This was verified using the statistical database of the All Pakistan Textile Mills Association (APTMA).

[6]Fill rate is defined in the literature as total imports as a percentage of adjusted base quota. Even though the adjusted base quotas can exceed base quotas, fill rates cannot exceed 100 since they are defined as imports over adjusted base. Evans and Harrigan (2005) define a binding quota as one in which the fill rate exceeds 90 percent.

NAICS 315222: Men's and Boys' Cut and Sew Suit, Coat, and Overcoat
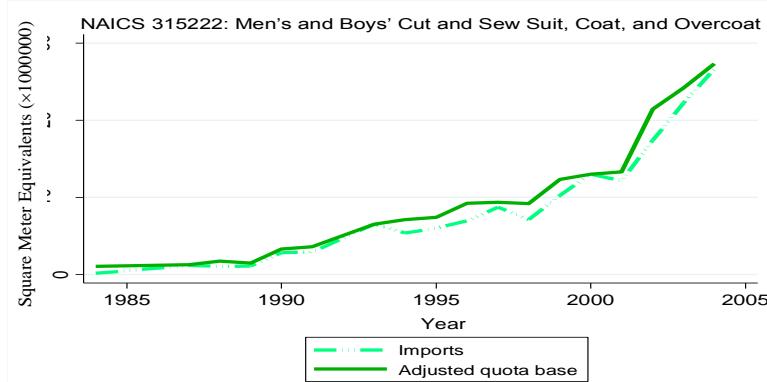
Source: US MFA/ATC Database [Brambilla, *et al*. (2007)].

Let us look at two examples.[7] Figure 2 exhibits total imports into the U.S. from Pakistan and adjusted quota base from 1984 up to 2004 for two T&C products, one from the textile and clothing industries each. For Textile and Fabric Finishing as well as Men's and Boys' Cut and Sew Suit, Coat, and Overcoat, the actual number of imports closely followed the adjusted quota base. In the light of the phasing out of MFA, this evidence makes the case of Pakistan-U.S. trade in T&C industry all the more interesting for closer study.

The paper is organised as follows: in the next section, we present a brief literature review of the topic. In Section 3, we describe a methodology that can be used to measure the effect of liberalisation on firm efficiency, and the data used in our analysis. Empirical results are presented and discussed in Section 4. The main conclusions and policy implications are summarised in Section 5.

2. LITERATURE REVIEW

A variety of studies look into the efficiency of manufacturing industries as a result of trade liberalisation [Pavcnik (2002); Krueger and Baran (1982); Bernard, *et al*. (2006); Sasidaran and Shanmugam (2008)]. Many developing countries have embarked on programmes of trade and financial liberalisation. In the old trade theory, welfare gains from trade are because of specialisation in line with the comparative advantage. On the other hand, in the new trade theory, these welfare gains accrue from economies of scale and expansion of product varieties [Bernard, *et al*. (2007)]. Empirical analyses at the firm level offer evidence for aggregate productivity growth driven by the contraction and exit of low-productivity firms and expansion and entry of high productivity firms. Pavcnik (2002) finds that approximately two-thirds of the 19 percent increase in aggregate productivity following Chile's trade liberalisation in the late 1970s is because of the relatively longer survival and growth of high-productivity plants. Another study by Krueger and Baran (1982) estimates the rates of total factor productivity (TFP) growth for two-digit manufacturing industries in Turkey during 1963−1976. The paper shows that periods of slower productivity growth coincided with periods of stringent trade

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[7]Table A.1 in Appendix A displays the adjusted quota base, level of imports and fill rates for a sample of OTEXA (US Office of Textile and Apparel) categories.

regimes. These findings are not confined to developing countries. The effects of a reduction in U.S. trade costs are examined by Bernard, *et al.* (2006).

These studies focus on liberalisation that primarily comprised reduction in tariff rates or a fall in trade costs. There is limited evidence, for example, on the effect of a liberalisation regime mainly featuring an increase in the amount of quota, as in the case of MFA expiration that a sizeable number of studies examine on the reallocation of production and exports across countries. Using a time series of product-level data from the U.S. on quotas and tariffs that comprise the MFA, Evans and Harrigan (2005) analyse how MFA affected sources and prices of U.S. apparel imports, with a particular focus on East Asian exporters during the 1990s. Brambilla, *et al.* (2007) examine China's experience under the U.S. apparel and textile quotas. These studies pertain to the macroeconomic outcomes of the end of MFA, and do not consider the impact on textile producing firms. Using Bangladeshi garment exporters' data, Demidova, *et al.* (2006) model and present evidence for the pattern of exports and performance of heterogeneous firms in response to variations in trade policy in diverse product and export destinations. A study by Sasidaran and Shanmugam (2008) attempts to empirically investigate the implications of the end of MFA on firm efficiency in Indian textile industry. By employing stochastic frontier analysis, they estimate the overall and input specific efficiency values for 215 sample firms during 1993 and 2006. The results of the analysis illustrate that average efficiency dropped over the years. However, their empirical methodology does not utilise the actual number of quotas imposed by the developed countries on the import of T&C products from India, and instead models the end of MFA by introducing a dummy variable for each of the four phases. Our paper, on the other hand, uses an exceptional database initially used by Brambilla, *et al.* (2007), which traces U.S. trading partners' exports to the U.S. in addition to the actual amount of quota under the regimes determined by MFA (1974–1995) and the succeeding ATC (1995–2005). This source of data is combined with a unique company-level data set which is a compilation of annual reports of a representative sample of T&C companies in Pakistan. Hence, the paper merges micro-level data of firms with the data on quotas at the industry level in order to answer an essential question which has been the centre of debate in the new trade theory.

A large number of papers that analyse the impact of trade liberalisation on firm performance are repeatedly criticised for endogeneity inherent in either the estimation of productivity or in the principal regression model used to regress the performance variable on a proxy for trade liberalisation, such as the tariff rate [Goldberg and Pavcnik (2005); Grossman and Helpman (1994); Mobarak and Purbasari (2006)]. Hence, the relationship between openness and performance cannot be taken to imply causality. This is usually the case because liberalisation is more often a part of a broader package of reforms; and improvement in firm efficiency cannot be traced to trade reforms specifically. Moreover, even if trade reforms do not come as a part of a package of reforms, there is always a possibility of lobbying by firms in order to circumvent these reforms whenever these are feared to harm them. This is widespread in the case of developing countries. There is literature that argues that a selection of industries have political power to lobby governments for protection [Grossman and Helpman (1994)]. Mobarak and Purbasari (2006) find that political connections do not affect tariff rates in Indonesia: it is hard for governments in developing countries to offer favours since they are under the close

scrutiny of international organisations.[8] The potential bias is also diminished as the estimates include fixed effects. If time-varying industry characteristics could, at the same time, affect both productivity and tariffs, the bias may persist. Just like Goldberg and Pavcnik (2005), they use the 1991 levels of tariffs as instruments for changes in tariffs.[9] Because of the regression specification used in the paper, whereby we regress the change in *firm* productivity on the adjusted level of quotas at the six-digit NAICS *industry* level, we can rule out the possibility of lobbying by firms. This is because it is not viable for an individual firm to influence the amount of textile quota at the industry level. Consequently, the MFA expiration can be thought of as a 'natural experiment.' This methodology has been used in order to avoid the potential problem of endogeneity of the trade proxy that is used in the empirical estimation of the effect of elimination of import quotas. Even if the actual amount of quota, that is obtained by each individual firm, were available, including that in the basic regression as a control variable, it would have been problematic due to the endogeneity of the firm's ability to obtain the quota license in a regression where the firm's efficiency is the dependent variable. Due to the availability of a considerable amount of highly disaggregated NAICS industry level quota data, the employment of this methodology allows us not only to overcome the potential endogeneity, but also to introduce sufficient amount of variation in the control variable used.

Last but not least, we use the structural techniques proposed by Olley and Pakes, and Levinsohn and Petrin in order to take care of endogeneity in the estimation of production functions. We notice that the results vary across textile and clothing industries; MFA expiration lead to an increase in the average productivity of textile producing firms but a significant reduction in the mean productivity of clothing and garment producers. Finally, in order to measure the effect of quotas directly on firm's output, we regress output on the adjusted level of quotas and trade costs. In the textile sector, an increase in the adjusted level of quotas leads to a significant rise in the firm's output. Nevertheless, this result is not statistically significant for the clothing sector.

In short, the most important contribution of this paper is that it is one of the very few studies that investigate the effect of liberalisation in the form of phasing out of quotas on firm-level productivity in the textile and clothing industry. Unlike most other studies in the literature which mainly analyse the impact of trade liberalisation in a developing country, for example, in the form of a reduction in average tariff rates, this paper investigates the liberalisation episode initiated by the U.S. by means of eliminating import quotas on textile and clothing products exported by developing countries to the U.S. It underlines cross-sector disparity in the effect of MFA expiration in the developing country and that trade reforms may influence different sectors heterogeneously even within the manufacturing industry of Pakistan.

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[8]Mobarak, A. M. and D. Purbasari (2006). Corrupt Protection for Sale to Firms: Evidence from Indonesia. (Unpublished).

[9]The instruments that they use are: 1991 levels of output tariffs, 1991 levels of input tariffs, an interaction between the 1991 input tariffs and a firm-level indicator equal to one if the firm was an importer in all years, a dummy indicator for product codes that consisted of at least one nine-digit HS code that was barred from the commitment to cut bound tariffs to 40 percent, and the share of skilled workers at the five-digit industry level.

3. EMPIRICAL METHODOLOGY

In this section, we discuss the empirical methodology used to measure the impact of the end of MFA on firm performance in the textile and apparel industries of Pakistan from 1992 to 2010. We will then describe the data set used in the paper. To determine the effect of trade liberalisation on firm performance, we first need to find a measure of productivity for the firms in our sample. This measure is then related to an index of openness using a simple regression equation.

There are quite a few ways of measuring the productivity change in response to a change in policy. An econometric issue facing the estimation of production functions is the likelihood that some of these inputs are unobserved. If the observed inputs are chosen as a function of these unobserved inputs, then there is an endogeneity problem [Ackerberg, *et al.* (2005)]. A second endogeneity problem appears because of sample selection. There is a group of contemporary techniques alongside the dynamic panel data literature and the methods introduced by Olley and Pakes (1996), and Levinsohn and Petrin (2003). The Olley and Pakes methodology (OP) is derived from dynamic optimisation of firms, whereby it is assumed that unobserved productivity follows a first order Markov process and capital is accumulated by means of a deterministic dynamic investment process.[10] Levinsohn and Petrin (LP) adopt a similar approach to solving the endogeneity problem. Instead of using an investment demand equation, they use an intermediate input demand function. In this section, we use structural techniques proposed by Levinsohn and Petrin.[11]

Consider a firm with a Cobb-Douglas production function:

$$Y_{ijt} = A_{ijt}(\tau)L_{ijt}^{\beta_l}M_{ijt}^{\beta_m}K_{ijt}^{\beta_k} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (1)$$

where output of firm i in six-digit industry j at time t, Y_{ijt}, is a function of labour, L_{ijt}, capital, K_{ijt}, and materials, M_{ijt}. We want to test if productivity of firm i is a function of trade policy, denoted by τ. Taking natural logs, denoted by small letters, we get:

$$y_{ijt} = \beta_0 + \beta_l l_{ijt} + \beta_m m_{ijt} + \beta_k k_{ijt} + e_{ijt}. \quad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (2)$$

The output of firm i is computed using the firm's total revenue which is the only proxy for total production that is available in our data. Therefore, the total revenue of the firm is deflated by two-digit industry-level producer price indices to obtain y_{ijt}. The real labour, l_{ijt}, is taken to be the total number of employees, and the amount of material inputs, m_{ijt}, is retrieved using total material expenditure.[12] Although domestic and

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[10]Profit maximisation generates an investment demand function that is determined by two state variables, capital and productivity. If the investment demand function is monotonically increasing in productivity, it is feasible to invert the investment function and get an expression for productivity as a function of capital and investment.

[11]See Olley and Pakes (1996), and Levinsohn and Petrin (2003) for a complete explanation of the method. A brief review is also given in Appendix B.

[12]Additional units of both labour and material inputs are assumed to be equally productive, and hence, deemed to be of equal marginal productivity.

imported inputs should be adjusted by separate deflators, the balance sheet data does not provide information on the share of imported inputs. Hence, all material inputs are deflated with a two-digit producer price deflator.[13] Productivity is then computed using LP, and the change in firm productivity is regressed on the change in the adjusted level of quotas and trade costs:

$$\Delta tfp_{ijt} = \beta_0 + \beta_1\Delta\log(AdjQuota)_{jt} + \beta_2\Delta\log(Cost)_{jt-1} + X_{ijt} + \delta_t + \delta_j + \varepsilon_{ijt}, \quad (3)$$

where $\log(AdjQuota)_{jt}$ is the logarithm of adjusted level of quotas, and $\log(Cost)_{jt-1}$ is the logarithm of industry trade costs at date *t*-1. δ_t and δ_j are time and industry fixed effects, respectively, and ε_{jt} is the error term. Following Bernard, *et al.* (2006), we define industry variable trade costs as the sum of ad valorem duty and ad valorem freight and insurance rates.[14] The inclusion of non-tariff barriers (NTBs) such as quotas in the regression equation, unlike Bernard, *et al.* (2006), is an added advantage of this empirical methodology since NTBs are a vital source of trade distortions. X_{ijt} includes other control variables: a dummy variable for the city in which the firm is located, size, age and capital intensity of the firm, whether or not the firm is ISO certified, whether or not the firm is multinational and, lastly, the Herfindahl index of the industry at the six-digit level. Size is measured by the number of workers; capital intensity is the ratio of capital to number of employees; firm age is the number of years since establishment; the Herfindahl index is an indicator of the amount of competition.

In order to quantify the impact of quotas directly on the firm's output, we regress output on the level of quotas:

$$y_{ijt} = \beta_0 + \beta_1 m_{ijt} + \beta_2 k_{ijt} + \beta_3 l_{ijt} + \beta_4\log(AdjQuota)_{jt}$$
$$+\beta_5\log(Cost)_{jt-1} + X_{ijt} + \delta_t + \delta_j + \varepsilon_{ijt} \qquad \dots \qquad \dots \qquad \dots \qquad (7)$$

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[13]Amiti and Konings (2007) show that domestic and imported input prices normally move together, provided they are substitutes. Their results are robust to deflating both domestic and imported material inputs by the same five-digit domestic materials deflators.

[14]Bernard, *et al*. (2006) define variable trade costs ($Cost_{jt}$) for industry *j* in year *t* as the sum of ad valorem duty (d_{jt}) and ad valorem freight and insurance (f_{jt}) rates:

$$Cost_{jt} = d_{jt} + f_{jt} \quad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (4)$$

The ad valorem duty rate is duties collected ($duties_{jt}$) corresponding to free-on-board customs value of imports (fob_{jt}):

$$d_{jt} = \frac{duties_{jt}}{fob_{jt}} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (5)$$

Likewise, the ad valorem freight rate is the markup of the cost-insurance-freight value (cif_{jt}) over fob_{jt} relative to fob_{jt}:

$$f_{jt} = \frac{cif_{jt}}{fob_{jt}} - 1 \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (6)$$

The rate for industry *j* is the weighted average rate across products in *j,* using the import values from the source countries as weights. This measure of trade costs has several advantages. It includes information concerning both trade policy and transportation costs, and it varies across industries and time. For a complete discussion of the advantages and disadvantages of this measure, see Bernard, *et al*. (2006).

This paper uses Balance Sheet Data of Pakistani Listed and Non-Listed Companies (BSDPC) which is a survey of a representative sample of 321 T&C companies in Pakistan for the years 1992 to 2003. The surveys encompass a wide range of topics.[15] The data set is an unbalanced panel data and it covers almost all large and medium-sized formal manufacturing enterprises. However, the coverage of the industrial sector is not complete since informal enterprises are excluded, and small formal firms are under-represented. The core survey is organised into four parts: Balance Sheet, Profit & Loss Account, Cash Flow Statement, and Accounts Section. For each company and year, we observe the sales revenue, input use, investment, wage bill, and all other costs, as well as industry codes and firm identity codes that allow us to track establishments over time. However, several observations are either not available or are reported as missing for different variables, such as, wages and sales. We test whether these values are systematically missing for particular types of firms, industries, or years but find that this was not the case.

The literature talks about a sample selection problem stemming from the possible association between TFP and plant exit; the unbalanced nature of our panel deals with this potential challenge to some extent. Entering and exiting firms are detected in the data by comparing firm identity codes overtime. Whenever there were gaps in the time-series data for a firm, we interpolated one- and two-year gaps in employment and sales variables and excluded the firm altogether if there was a larger gap in the data. To estimate Equations (3) and (7) using a panel of firms, we needed data on real output, capital stock, labour, raw materials, and their respective shares in real output. Nominal output deflated by sectoral price deflators gave the real output.[16] Real labour was found by deflating the total wage bill by industry wage rate.[17] Materials were also deflated using two-digit sectoral price deflators.[18] The real capital stock was calculated by deflating net fixed assets by sectoral investment deflators. Table 5 provides summary statistics for the balance sheet data used.

[15]They are carried out in cooperation with the Lahore University of Management Sciences (LUMS), Pakistan. The survey is completed by managing directors and accountants of the company. The data compiled by LUMS only covers the period 1992 to 2003. We updated the dataset to add seven more years of data on sales revenue, input use, investment, and so forth. The paper, therefore, uses data from 1992 to 2010. This was done in order to compute firms' productivity during the final phase of MFA expiration as well, since we know that the initial phases of ATC were not very severe for producers in developed countries.

[16]*The Economic Survey of Pakistan*, which is published annually by the Ministry of Finance, Government of Pakistan, provides price indices at the two-digit industry level for output and intermediate inputs which are used as deflators.

[17]Real labour is taken to be the total number of employees, and not the number of hours worked, since the hourly wage rate is not known. Many firms list the number of employees directly so there is no need to deflate the wage bill by the industry wage rate.

[18]Ideally, material inputs should be deflated by separate price indices for each different type of material used in the production of the final good. However, the balance sheet data only lists the total material expenditure. Harrison (1994) shows that the estimates based on deflating the material inputs using the Input-Output table for each sector are not very different from those computed using the two-digit sectoral price deflators.

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Table 5

Summary Statistics

Variable	Observations	Mean	Standard Deviation
Ln(Sales)	4717	19.24889	3.725365
Ln(Fixed Assets)	4718	11.5004	9.505546
Ln(Labour)	4718	16.36191	1.92692
Ln(Raw Materials)	4718	18.70915	3.581584
Ln(Net Profit)	4718	12.99495	10.32405
Ln(Investment)	4813	4.016176	7.223366
Productivity (Levinsohn and Petrin)	4717	10.55175	5.720158
Productivity (Olley and Pakes)	4717	1.870537	3.044538
Age	2895	23.78066	16.09899
Ln(Age)	2846	2.9679	.8172853
Ln^2(Age)	2846	9.476151	4.306341
Ln(Capital to Labour Ratio)	4407	.733027	.5847288
Herfindahl Index	4813	.8199503	.6192361
ISO Certified	4606	.6743378	.4686726
Multinational	4606	.09835	.2978196
Share of Foreign Ownership	4436	.2193417	.4138473
Exporting Firm	4606	.8790708	.3260804
Importing Firm	4606	.4240122	.4942458
Ln(Cost of Imports)	2385	.1535817	.108629
Ln(Adjusted Base New)	3980	29.10755	16.11072
Ln(Adjusted Base)	2499	16.72591	1.134198
Ln(Imports)	1544	16.43371	2.013854
Average Fill Rate	2143	.806451	.1900999

This paper is based on a panel of firms instead of industry data. Accordingly, we can be fairly specific about the sources of productivity change. It tracks a single firm through time, eliminating the obscuring firm-specific effects. The paper utilises the data initially used by Brambilla, *et al.* (2007) that traces U.S. trading partners' performance under the quota regimes determined by MFA and ATC. The database is assembled from U.S. trading partners' Expired Performance Reports, which were used by the U.S. Office of Textile and Apparel (OTEXA) to supervise trading partners' fulfilment with the MFA/ATC quotas. Provided by Ron Foote of the U.S. Census Bureau, they record imports, base quotas and quota adjustments by OTEXA category and the year for all

countries with which the U.S. negotiated a bilateral quota arrangement.[19] The negotiated quota for any given category is stated in terms of square meter equivalents (SME) of fabric.[20] The data on trade costs is taken from Bernard, *et al*. (2006) which provides data on free-on-board customs value of imports, *ad valorem* duty and *ad valorem* freight and insurance rates for the underlying four-digit product-level U.S. import data.[21] The next section discusses the estimation results.

4. ESTIMATION RESULTS

To determine the effect of trade liberalisation on firm efficiency, we first need to find a measure of productivity for the firms in our sample. We estimate the production function coefficients for firms in each sector separately using a Cobb-Douglas production function and the structural techniques proposed by Levinsohn and Petrin. These estimates are used to work out the log of measured TFP of firm i at time t for each six-digit industry j. The change in firm productivity is then regressed on the change in adjusted level of quotas, allowing for time and industry fixed effects. Table 6 reports the production function estimates for T&C firms using LP. Robust standard errors corrected for clustering at the firm level are stated in parentheses. The regression results are illustrated in Tables 7 to 8.

Table 6

Production Function Estimates for Textile and Clothing Firms—Levinsohn and Petrin

	Textile	Clothing
	(1)	(2)
Employment	0.246***	0.285***
	(0.0313)	(0.0327)
Fixed Assets	0.0312***	0.0340**
	(0.00805)	(0.0152)
Raw Materials	0.125	0.171
	(0.116)	(0.160)
No. of Observations	3274	1443

Notes: Robust standard errors corrected for clustering at the firm level in parentheses. *** Significant at, or below, 1 percent. ** Significant at, or below, 5 percent. * Significant at, or below, 10 percent.

[19]The base quota is the initially negotiated quota level decided at the beginning of an agreement term. Adjusted base quotas indicate the use of 'flexibilities', which allowed countries to go over their base quota in a particular period by borrowing unexploited base quota, across categories within a year and across years within a category, up to a specified percentage of the receiving category.

[20]In addition, when the quotas are completely removed in Phase IV, the adjusted quota base is essentially equal to infinity. There are a number of possible ways of handling it. For example, we could assume a 'very large' value of the adjusted level of quotas, and vary that value to test if our results are sensitive to this hypothetical value of the adjusted level of quotas. Another possible way is to predict the adjusted quota level using the past values of the fill rates. A number of these methods were used in order to prove that the results are robust to functional form differences.

[21]The data on trade costs is available only for the years 1992-2004.

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Table 7

Effect of Elimination of Quota-Restrictions on Textile Firm Productivity—
Levinsohn and Petrin

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Adjusted Quota	0.0238***	1.277**	1.266**	1.250**	1.192**	1.567*	1.692**
	(0.00520)	(0.534)	(0.530)	(0.557)	(0.535)	(0.875)	(0.850)
Cost of Imports		–0.126	–0.124	–0.120	–0.122	0.0965	0.0971
		(0.225)	(0.225)	(0.223)	(0.237)	(0.175)	(0.173)
Herfindahl Index		0.0619	0.0602	0.0596	0.0673	0.0924*	0.0971*
		(0.0509)	(0.0507)	(0.0509)	(0.0501)	(0.0547)	(0.0566)
Multinational			0.410*	0.215	0.149	0.0126	0.162
			(0.234)	(0.206)	(0.200)	(0.192)	(0.261)
ISO Certified				0.830***	0.827***	1.020*	0.839
				(0.176)	(0.169)	(0.578)	(0.574)
K/L (–1)					–0.0333	–0.0709	–0.0696
					(0.158)	(0.0823)	(0.0883)
Size (–1)					0.0474*	–0.0246	–0.0273
					(0.0282)	(0.0203)	(0.0198)
Age						0.118	0.117
						(0.206)	(0.222)
Age^2						0.0262	0.0346
						(0.0430)	(0.0510)
Constant	11.47***	–12.03	–11.80	–12.47	–11.96	0	0
	(0.305)	(10.03)	(9.973)	(10.50)	(10.20)	(0)	(0)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City Effects	Yes	Yes	Yes	Yes	Yes	No	Yes
No. of Observations	2767	1570	1570	1570	1567	996	996

Notes: Robust standard errors corrected for clustering at the firm level in parentheses. (–1) denotes lagged variables.
*** Significant at, or below, 1 percent. ** Significant at, or below, 5 percent. * Significant at, or below, 10 percent.

Table 8

Effect of Elimination of Quota-Restrictions on Clothing Firm Productivity—
Levinsohn and Petrin

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Adjusted Quota	–0.972***	–1.003***	–0.998***	–1.069***	–1.692***	–0.753***
	(0.246)	(0.248)	(0.248)	(0.255)	(0.327)	(0.195)
Cost of Imports (–1)	–8.697	–8.787	–8.793	–9.737*	–11.70	–11.22
	(6.040)	(6.041)	(6.051)	(5.796)	(7.886)	(8.823)
Herfindahl Index (–1)		–0.155**	–0.155**	–0.192**	–0.241***	–0.182**
		(0.0719)	(0.0720)	(0.0765)	(0.0879)	(0.0782)
Multinational			–0.773	–0.749	–4.371***	–2.368
			(1.546)	(1.572)	(1.538)	(1.981)
ISO Certified				0.403	1.097	1.719
				(1.148)	(1.943)	(2.174)
K/L (–1)				0.946*	0.969	0.807
				(0.563)	(0.659)	(0.700)
Size (–1)				0.0885*	0.117**	0.0716
				(0.0458)	(0.0536)	(0.0572)
Age					0.669	0.104
					(0.490)	(0.513)
Age^2					–0.0968	0.277
					(0.196)	(0.248)
Constant	0	0	14.13***	16.59***	26.45***	0
	(0)	(0)	(4.739)	(4.371)	(6.223)	(0)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
City Effects	Yes	Yes	Yes	Yes	No	Yes
No. of Observations	503	503	503	502	315	315

Notes: Robust standard errors corrected for clustering at the firm level in parentheses. (–1) denotes lagged variables.
*** Significant at, or below, 1 percent. ** Significant at, or below, 5 percent. * Significant at, or below, 10 percent.

4.1. Effect on Productivity

Tables 7 and 8 report the estimation results for the effect of elimination of quota restrictions on textile and clothing firm productivity, respectively. The results vary across the two types of industries: an increase in adjusted level of quotas, on average, brings about a significant increase in the productivity of firms in the textile industry (see Table 7) and a reduction in mean productivity in the clothing industry (refer to Table 8). These estimation results are derived after controlling for the firm's size, capital intensity, age, whether or not the firm is ISO certified, whether or not the firm is a multinational, Herfindahl index of the industry at the six-digit level, and lastly, the city in which the firm is located. Although trade costs do not seem to have a significant impact on textile firms, there is clearly a negative relationship between trade costs and the productivity of garment producers; the productivity of clothing firms goes up, on average, if trade costs go down, and the estimates are significantly different from zero in a number of cases as can be seen in Table 8. As far as trade costs coefficient for textile firms is concerned, the estimates take both positive and negative values, and none of the values are statistically significant. The positive coefficient of trade cost for textile producers might be indicative of a selection effect for these types of firms, as is highlighted in the literature on the new trade theory [Pavcnik (2002)]. This suggests that as a consequence of a rise in variable trade cost, coupled with exposure to international competition, only the most productive firms are able to survive. As a result, an upsurge in trade cost will cause the mean productivity of textile producers to go up.

Let us look at other control variables in Tables 7 and 8. Again, as far as capital intensity of the firm is concerned, the two types of firms display disparate results. Higher capital intensity has a significantly positive impact on productivity of clothing firms but not on the productivity of textile producers. For most of the different specifications shown in Table 7, the coefficient for size is negative for textile firms. However, the only case where it is significant is when it takes a positive value. On the other hand, it is always positive and significant for clothing firms (see Table 8).

Another intriguing point to be noted is that the sign of Herfindahl index coefficient is positive and significant for only textile firms; on the other hand, it is negative and highly significant for clothing firms, as can be seen in Tables 7 and 8. This indicates that higher concentration in the industry results in lower productivity for clothing firms but not for textile firms. One would generally expect that greater degree of concentration in an industry leads to greater market power for firms in that industry and, hence, lowers their productivity growth. This is not the case for textile producers. One possible explanation for this result is that, although there might be a small number of firms with a lot of market power, there is an intense competition amongst them which forces them to become more productive in order to capture an even bigger market share. That is why higher concentration in the textile industry would imply that textile producers are, on average, more productive than if there were a large number of firms capturing an almost similar market share. While this explanation is plausible, another explanation could be related to returns to scale. The textile industry is dominated by a few capital intensive firms with higher returns to scale. With the expansion of quotas, these firms might be capable of ramping up their output, and productivity, rapidly because of their already large capital investment. Within the textile industry, sub-industries with more of these

large firms (concentrated sub-industries) will be better able to ramp up output and productivity. On the contrary, the lower returns to scale and lower capital intensity of the clothing industry may restrict the output and productivity expansion.

Textile multinational firms, on average, tend to have higher productivity compared to non-multinational textile firms (see Table 7). This is not the case for clothing producers: the multinational clothing firms have a significantly lower mean productivity compared to non-multinational clothing firms (see Table 8). Older textile firms, which are also likely to be bigger in size, appear to be much more productive than their younger counterparts.

For most of the above-mentioned control variables, we have seen that the results are different across two types of firms. The only case where it is indistinguishable is in the case of ISO certified T&C firms. ISO certification affects firm efficiency positively: a firm certified for its quality management system has a higher productivity, on average, than a firm that is not certified (see Tables 7 and 8). These estimation results are arrived at after controlling for industry, time and city fixed effects. The city fixed effects take into account the fact that some firms are located in more developed areas compared to others. There may be differences in infrastructural facilities in different parts of the country which are taken care of by regional fixed effects.

Furthermore, we run this regression separately for the MFA period (1992-1994) and post-MFA period (1995-2010), along with each of the four phases individually.[22] Table 9 demonstrates the estimation results for the four phases. In all the phases, an increase in the adjusted level of quotas brings about a significant reduction in the clothing firm's productivity and an increase in the productivity of firms in textile industry. This is also true for post-MFA period as a whole. Only in Phase IV do we observe that the productivity of clothing firms is positively related to the level of the quotas. Nevertheless, the positive coefficient is not statistically significant. For a majority of control variables described above, we do not observe a noticeable change in either the sign or the magnitude of coefficients (see Table 9).

4.2. Effect on Output

In order to measure the effect of quotas directly on the firm's output, we regress output on the adjusted level of quotas and trade costs. The results are shown in Table 10. There are a number of interesting points to be examined here. First of all, the results vary for both types of industries. In the textile sector, an increase in the adjusted level of quotas leads to significant rise in the firm's output. For the clothing sector, however, this result is not statistically significant. Since quotas are measured by quantity and not value, under a given quota, producers try to manufacture high value products. Consequently, MFA expiration is expected to bring about a shift in the production of lower-value products. There is a significant reduction in output if trade costs go up in the textile sector. This, in contrast, is not true for clothing firms: an increase in trade costs, on average, results in an increase in output in clothing industry and the estimates are significantly different from zero in nearly all the cases (see Table 10).

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[22]The estimation results for the MFA and post-MFA periods alone are not shown here but can be made available upon request.

Table 9

Effect of Elimination of Quota-Restrictions on Firm Productivity—
Levinsohn and Petrin

Variable	Phase 1		Phase 2		Phase 3		Phase 4	
	Textile	Clothing	Textile	Clothing	Textile	Clothing	Textile	Clothing
Adjusted Quota	0.862	−0.466	0.845	−1.424**	6.039***	−2.291*	0.0546	0.0200
	(0.539)	(0.362)	(0.673)	(0.682)	(0.890)	(1.230)	(0.108)	(0.155)
Cost of Imports	0.00578	4.801	−6.675	5.707	2.009	−1.788	–	–
	(0.289)	(3.895)	(4.732)	(5.436)	(6.765)	(8.671)	–	–
Age	0.364	1.524*	−0.193	0.00114	2.098	0.0364	4.530	−4.135
	(0.449)	(0.840)	(1.007)	(0.283)	(2.655)	(0.867)	(3.088)	(3.293)
Age^2	−0.00151	−0.171	0.0873	0.0409	−0.319	0.0312	−0.629	1.279
	(0.0870)	(0.380)	(0.188)	(0.240)	(0.411)	(0.433)	(0.457)	(0.859)
Size (−1)	0.0271	0.106*	0.0196	0.119	0.0985	0.122***	0.0348*	0.0370
	(0.0328)	(0.0642)	(0.0284)	(0.0737)	(0.0645)	(0.0372)	(0.0188)	(0.0293)
K/L (−1)	−0.256**	0.618	0.0456	0.163	0.0513	2.254***	−0.252**	0.0254
	(0.116)	(0.579)	(0.121)	(0.205)	(0.236)	(0.779)	(0.102)	(0.0816)
Herfindahl Index	0.0734	−0.101	0.00460	−0.162*	0.190	0.0704	−0.0418	−0.00690
	(0.0600)	(0.0741)	(0.0477)	(0.0857)	(0.167)	(0.107)	(0.0504)	(0.0539)
ISO Certified	0.00166	−0.0829	1.099	0.647	0.789	−1.939	1.713	−0.972
	(0.241)	(5.173)	(0.826)	(2.137)	(0.793)	(2.815)	(1.071)	(8.757)
Multinational	−0.217	−0.557	0.429	−0.712	0.154	0.666	−0.528	−5.204
	(0.309)	(1.888)	(0.300)	(1.859)	(0.256)	(3.135)	(0.401)	(3.246)
Constant	0	0	2.036	15.17	−106.2***	0	0	0
	(0)	(0)	(14.52)	(12.41)	(17.02)	(0)	(0)	(0)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	298	89	405	139	202	61	645	192

Notes: Robust standard errors corrected for clustering at the firm level in parentheses. (−1) denotes lagged variables. *** Significant at, or below, 1 percent. ** Significant at, or below, 5 percent. * Significant at, or below, 10 percent.

Table 10

Effect of Elimination of Quota-Restrictions on Output

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Textile			Clothing		
Raw Materials	0.264***	0.285***	0.132***	0.0816**	0.0344	0.0102
	(0.0629)	(0.0741)	(0.0503)	(0.0393)	(0.0286)	(0.0269)
Labour	0.0907***	0.0711***	0.0597***	0.114**	0.0315	0.0167
	(0.0232)	(0.0246)	(0.0200)	(0.0458)	(0.0353)	(0.0456)
Fixed Assets	0.0550*	0.0448	0.0764*	0.0936**	0.122**	0.0712
	(0.0329)	(0.0390)	(0.0453)	(0.0410)	(0.0533)	(0.0539)
Adjusted Quota Level	0.137	1.523**	2.409**	0.494	0.420	0.975*
	(0.246)	(0.702)	(1.049)	(0.334)	(0.353)	(0.509)
Cost of Imports (−1)		−0.287	−0.422*		7.774*	11.71*
		(0.210)	(0.232)		(4.265)	(6.185)
Multinational		0.379*	0.386		−1.981	−3.538
		(0.200)	(0.285)		(2.074)	(3.479)
ISO Certified		0.770***	0.979		1.709***	2.512***
		(0.191)	(0.676)		(0.421)	(0.896)
Age			−0.0135			2.699
			(0.249)			(1.925)
Age^2			0.0652			−0.493
			(0.0574)			(0.428)
Constant	8.567*	0	−32.82	6.674	3.331	0
	(4.752)	(0)	(20.00)	(6.044)	(6.514)	(0)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
City Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	1811	1461	929	648	503	316

Notes: Robust standard errors corrected for clustering at the firm level in parentheses. (−1) denotes lagged variables. *** Significant at, or below, 1 percent. ** Significant at, or below, 5 percent. * Significant at, or below, 10 percent.

Another remarkable point is that a textile multinational firm has, on average, a significantly higher output compared to a textile firm that is not a multinational company, whereas, the corresponding coefficient for clothing firms is negative. On average, older textile firms produce lesser output, but this is not true for clothing firms. Both, the ISO certified textile as well as clothing firms have a higher output compared to a textile or clothing firm that is not ISO certified, and this finding is statistically significant. To sum up, MFA expiration led to an increase in output of T&C firms in Pakistan. However, for a majority of specifications that we consider, this result is statistically significant only for the textile firms (refer to Table 10).

4.3. Discussion and Limitations of Analysis

The above analysis highlights cross-sector variation in the effect of MFA expiration. As is frequently emphasised in the new trade theory literature, trade reforms often influence different sectors heterogeneously even within the manufacturing industry. However, what seems intriguing is that in our case the outcome differs within what is typically lumped together as the textile industry. A liberalisation episode such as phasing of quotas may generate divergent changes in productivity levels of different categories of products even within an industry. MFA expiration will potentially boost competition, both between and within countries, weakening tendencies toward oligopolies, thereby resulting in technological advancement and productivity growth. We see this happening in the textile sector. Pakistan has had a relatively better textile sector historically. The textile industry is labour intensive and the primary input is cotton. The country has a high production of cotton and a sizeable labour force that confirms its strong revealed comparative advantage in the production of textile goods. On the other hand, clothing industry still faces the challenge of obsolete machinery. Energy outages, workforce development, product standards, fabric finishing, styles and patterns, customs and port procedures, and security are other factors that shape productivity growth. One reason why TFP may decline after the end of MFA for garment firms is competition from foreign sellers of garments in the Pakistani market. Since TFP confounds the effect of efficiency if its market share declines, it may result in depressing its measure. Any form of liberalisation like this has two opposing effects: market stealing of imports lowers sales for domestic firms and leaves less money available to invest in productivity improvements, and higher competition spurs some lagging firms to work harder and improve productivity in order to survive. The balance of these two effects might work out differently in both sectors, for example, because the initial level of competition may differ. Some theory papers incorporate asymmetric effects of liberalisation in the productivity level of firms. If non-exporting firms become exporters, we may see a decline in mean industry productivity because new exporters may need time to adapt to the new environment.

The difference in results across textile and garment firms is related to the structure of production, namely, the type of raw materials used by garment firms after the end of MFA. However, the data does not provide information about types of raw materials used and it is, therefore, hard to determine if this was the case. Another possible explanation is a change in product mix, for instance, a shift to the most productive production lines in textiles, and expansion into new products for which there is still some learning to do in the garment industry. Since MFA expiration, Pakistan has been changing the composition of its textile exports, from a broader category that benefitted from the MFA without much weight of Rules of Origin (RoO), to a narrower category focused on specific markets that offer Pakistan

preferential access through bilateral trade agreements with strict Rules of Origin. If this is the case, one would expect a fall in productivity as the mix of inputs utilised by firms would no longer be dictated by rationally choosing the optimal input-mix given market prices. If the composition of exports has changed in the stated way, one should attempt to decompose the TFP between RoO-affected and non-RoO-affected exports. Another aspect is that the country may have found it harder to compete with other countries in the garments sector because clothing is relatively more labour intensive than textiles; firms in Pakistan could have responded to, say, China's competition by upgrading the quality of Pakistani textiles but may not have done so in the garment sector because it is harder to upgrade quality in that sector. These cross-sector differences in quality ladders could play a crucial role under these circumstances.

4.4. Robustness Check: Alternative Measure of Productivity

This section provides an alternative measure of productivity to determine whether or not results derived so far are sensitive to empirical methodology used to estimate firm efficiency. The OP methodology can be used to account for simultaneity between input choices and productivity shocks, in addition to sample selection bias. Table 11 illustrates the estimation results when change in firm productivity is regressed on change in adjusted level of quotas using the OP productivity measure. We note that the results are not very different from LP regression estimates. As before, an increase in adjusted level of quotas brings about a significant reduction in the firm's mean productivity in clothing industry but not in the textile sector. Moreover, the sign and magnitude of most of the control variables' coefficients remain the same as under LP (see Table 11).

Table 11

Effect of Elimination of Quota-Restrictions on Textile and Clothing
Firms' Productivity—Olley and Pakes

Variable	(1)	(2) Textile	(3)	(4)	(5) Clothing	(6)
Adjusted Quota	1.087**	1.969***	2.047***	–1.170***	–1.647***	–0.646
	(0.539)	(0.752)	(0.727)	(0.306)	(0.353)	(0.575)
Cost of Imports (–1)	–0.146	0.124	0.103	0.110	–4.953	–5.612
	(0.238)	(0.223)	(0.225)	(6.915)	(10.55)	(11.24)
Herfindahl Index (–1)	0.110*	0.149*	0.162**	–0.189	–0.186	–0.113
	(0.0604)	(0.0760)	(0.0800)	(0.153)	(0.220)	(0.224)
Multinational	0.0807	0.0483	0.234	–2.523	–4.167	–3.935
	(0.173)	(0.139)	(0.200)	(2.181)	(3.770)	(3.583)
ISO Certified	0.362**	0.767*	0.583	0.773	1.292	2.066*
	(0.152)	(0.460)	(0.459)	(0.618)	(0.936)	(1.087)
K/L (–1)	–0.198	–0.169*	–0.187*	0.781	0.214	–0.00531
	(0.122)	(0.0912)	(0.107)	(0.486)	(0.755)	(0.777)
Size (–1)	–0.0156	–0.082***	–0.076***	0.115*	0.108	0.0278
	(0.0278)	(0.0259)	(0.0280)	(0.0590)	(0.0818)	(0.0837)
Age		–0.0244	–0.00227		3.653**	3.530*
		(0.267)	(0.281)		(1.841)	(2.100)
Age^2		0.0282	0.0372		–0.822**	–0.691
		(0.0496)	(0.0574)		(0.365)	(0.484)
Constant	–17.73*	0	0	11.77*	20.57***	0
	(10.05)	(0)	(0)	(6.369)	(7.319)	(0)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
City Effects	Yes	No	Yes	Yes	No	Yes
No. of Observations	1567	996	996	502	315	315

Notes: Robust standard errors corrected for clustering at the firm level in parentheses. (–1) denotes lagged variables. *** Significant at, or below, 1 percent. ** Significant at, or below, 5 percent. * Significant at, or below, 10 percent.

5. CONCLUSION AND POLICY IMPLICATIONS

The elimination of quotas has been the most important event in the global textile and garment industry in the past two decades. The textile sector is a key industry in Pakistan in terms of output, export value, foreign exchange earnings and employment. Along with the cost advantage in terms of proximity to a raw material base in cotton and man-made fibres, as well as the availability of cheap labour, what appears to be a crucial determinant of competitiveness in this industry is the ability to respond to rapidly changing consumer demands. This, in turn, requires greater investment in research and development to ensure greater mobility and adaptability of the production process to changes in fashion trends. Although the need to invest in cost-saving production methods is vital for the textile industry as well, it plays a greater role in the clothing industry owing to the nature of the finished good and its global price sensitivity. The sectoral heterogeneity in the effect of MFA expiration further corroborates this notion. The finding that mean productivity fell for the clothing firms as a result of the phasing out of quotas, points to the inability of these firms to shift to a more efficient composition of inputs as well as the product range of output produced in response to a more competitive world market. For example, according to a report by the World Bank's Poverty Reduction and Economic Management Sector Unit, compared to its competitors, Pakistani garment industry labour is cheaper but the least productive: limited training in productivity, design, and other product related skills are the major constraints to raising productivity, and clothing firms have been unable to tailor products particularly for their customers, deliver fast and within multiple fashion cycles in one season [Pakistan Growth and Export Competitiveness (2006)]. Even though several institutions for training and skills upgradation are present, in general, the country has an insufficient number of institutes that offer support services to garment firms. According to the report, higher efficiency at the firm level is necessary in order to compensate for the time costs associated with greater distance to the U.S. market. APTMA has been seeking duty-free access to the U.S. market for a large number of finished items. If the duty-free facility is provided, Pakistan can increase its export tremendously. More recently, the textile and clothing industry has faced an acute energy crisis. Energy shortages are forcing the textile industry to operate at almost half the capacity. If continuous gas and power supply are not guaranteed to the textile firms, exporters would not succeed to complete their orders on time, threatening total disintegration of Pakistani textile exports.

The most important contribution of this paper is that it is one of the few studies to empirically investigate the effect of liberalisation in the form of phasing out of quotas on firm-level productivity in the textile and clothing industry. The existing studies pertain to macroeconomic outcomes of the end of MFA, and do not consider the effect on textile firms. The studies that do attempt to evaluate the impact of lifting a quota at the firm level do not utilise the actual number of quotas imposed by developed countries on imports from developing countries. This paper, on the other hand, uses the database that traces U.S. trading partners' exports to the U.S. along with the actual amount of quota under the regimes determined by the MFA. Because of the nature of data and empirical methodology used, it effectively takes care of the endogeneity problem that is often challenging for analyses to estimate the effect of liberalisation on firm performance. We observe that MFA expiration led to an increase in average productivity of textile

producing firms but a significant reduction in mean productivity of clothing and garment producers. The paper draws attention to cross-sector variation in the impact of MFA expiration and to trade reforms that often influence different sectors heterogeneously even within the manufacturing industry. It proposes various explanations for this outcome, for example, a change in product mix, entry by non-exporters in clothing sector, cross-sector differences in quality ladders, and so forth.

The competitiveness of T&C industry hinges on numerous factors: labour cost, production costs (energy, water, production inputs, for example, cotton, polyester and chemicals), transport and distribution, and macroeconomic environment (domestic interest rates, corporate taxes, exchange rate, property rights, and political stability). The private sector in Pakistan appears to benefit from domestic raw material base in cotton and synthetic fibres, low labour costs, and large-scale investment in the last number of years. Clearly, the T&C industry has benefited from complimentary trade agreements with the US and EU since 2001 in relation to the fight against terrorism. The government is promoting diversification in terms of input use and products to lessen the concentration in low value-added products. It has been promoting progress in the weaving sector through implementation of standards and loan programmes to upgrade to auto looms. On the other hand, the industry faces the challenge of obsolete machinery, energy shortages and export concentration in low value-added products. The declining efficiency of clothing firms points to the failure of these firms to fight competition. MFA expiration is a chance for them to trim down their input usage which can help reduce export prices in the world market, yielding the desired competitive edge over other exporters.

Zara Liaqat

APPENDIX A

Table A.1

Sample OTEXA Categories—Adjusted Base, Imports and Fill Rates

Year	MFA Root	OTEXA Category Description	Native Units	Adjusted Base (SME)	Imports (SME)	Fill Rate
1993	219	Duck Fabric	M2	5500000	5500000	1
1994	219	Duck Fabric	M2	5885000	3983780	0.676938
1995	219	Duck Fabric	M2	5606114	2842510	0.507038
1996	219	Duck Fabric	M2	6818078	6058734	0.888628
1997	219	Duck Fabric	M2	8777010	8454310	0.963234
1998	219	Duck Fabric	M2	7200397	5611143	0.779283
1999	219	Duck Fabric	M2	7758895	3621719	0.466783
2000	219	Duck Fabric	M2	8736258	7030377	0.804736
2001	219	Duck Fabric	M2	1.08E+07	6753098	0.625608
2002	219	Duck Fabric	M2	1.16E+07	10054596	0.87003
2003	219	Duck Fabric	M2	1.30E+07	11025657	0.845117
2004	219	Duck Fabric	M2	1.67E+07	11393881	0.68291
1993	314	Cotton Poplin & Broadcloth Fabric	M2	3529200	3419602	0.968945
1994	314	Cotton Poplin & Broadcloth Fabric	M2	4750800	1882077	0.39616
1995	314	Cotton Poplin & Broadcloth Fabric	M2	3323319	1206620	0.363077
1996	314	Cotton Poplin & Broadcloth Fabric	M2	4958603	2935625	0.592027
1997	314	Cotton Poplin & Broadcloth Fabric	M2	6383279	6148264	0.963183
1998	314	Cotton Poplin & Broadcloth Fabric	M2	5577228	5577228	1
1999	314	Cotton Poplin & Broadcloth Fabric	M2	6944831	4895780	0.704953
2000	314	Cotton Poplin & Broadcloth Fabric	M2	6646990	6646990	1
2001	314	Cotton Poplin & Broadcloth Fabric	M2	9103492	9103492	1
2002	314	Cotton Poplin & Broadcloth Fabric	M2	9619245	9582178	0.996147
2003	314	Cotton Poplin & Broadcloth Fabric	M2	1.09E+07	10430209	0.960494
2004	314	Cotton Poplin & Broadcloth Fabric	M2	1.23E+07	9637755	0.786177
1991	315	Cotton Print Cloth Fabric	M2	5.16E+07	51576942	1
1992	315	Cotton Print Cloth Fabric	M2	5.44E+07	54413674	1
1993	315	Cotton Print Cloth Fabric	M2	6.06E+07	56601311	0.933711
1994	315	Cotton Print Cloth Fabric	M2	6.56E+07	63840951	0.973061
1995	315	Cotton Print Cloth Fabric	M2	6.70E+07	62885763	0.938984
1996	315	Cotton Print Cloth Fabric	M2	6.25E+07	48527274	0.77664
1997	315	Cotton Print Cloth Fabric	M2	8.60E+07	80625620	0.937126
1998	315	Cotton Print Cloth Fabric	M2	7.64E+07	76408847	1
1999	315	Cotton Print Cloth Fabric	M2	7.11E+07	57271284	0.805458
2000	315	Cotton Print Cloth Fabric	M2	7.52E+07	58815757	0.782006
2001	315	Cotton Print Cloth Fabric	M2	8.67E+07	78064295	0.90072
2002	315	Cotton Print Cloth Fabric	M2	1.17E+08	1.17E+08	1
2003	315	Cotton Print Cloth Fabric	M2	1.14E+08	1.06E+08	0.927237
2004	315	Cotton Print Cloth Fabric	M2	1.47E+08	78932440	0.537423

Source: US MFA/ATC Database [Brambilla, *et al.* (2007)].

Table A.1

Sample OTEXA Categories—Adjusted Base, Imports and Fill Rates (Continued)

Year	MFA Root	OTEXA Category Description	Native Units	Adjusted Base (SME)	Imports (SME)	Fill Rate
1994	317/617	MMF Twill And Sateen Fabric	M2	2.30E+07	17201696	0.7479
1995	317/617	MMF Twill And Sateen Fabric	M2	1.93E+07	12039372	0.622763
1996	317/617	MMF Twill And Sateen Fabric	M2	2.66E+07	19048809	0.714866
1997	317/617	MMF Twill And Sateen Fabric	M2	3.43E+07	34302672	1
1998	317/617	MMF Twill And Sateen Fabric	M2	2.99E+07	29901543	1
1999	317/617	MMF Twill And Sateen Fabric	M2	3.31E+07	21604068	0.652369
2000	317/617	MMF Twill And Sateen Fabric	M2	3.84E+07	32280324	0.840262
2001	317/617	MMF Twill And Sateen Fabric	M2	4.52E+07	33642099	0.744576
2002	317/617	MMF Twill And Sateen Fabric	M2	5.70E+07	55857219	0.979842
2003	317/617	MMF Twill And Sateen Fabric	M2	5.84E+07	56259003	0.964072
2004	317/617	MMF Twill And Sateen Fabric	M2	6.59E+07	56710278	0.860839
1991	331/631	Cotton & MMF Gloves & Mittens	DPR	4149613	4149612.9	1
1992	331/631	Cotton & MMF Gloves & Mittens	DPR	4298328	4298327.8	1
1993	331/631	Cotton & MMF Gloves & Mittens	DPR	5225211	5225211.3	1
1994	331/631	Cotton & MMF Gloves & Mittens	DPR	5947642	5925369.9	0.996255
1995	331/631	Cotton & MMF Gloves & Mittens	DPR	6430591	6430590.5	1
1996	331/631	Cotton & MMF Gloves & Mittens	DPR	7114654	7114654.1	1
1997	331/631	Cotton & MMF Gloves & Mittens	DPR	7355412	7355412.1	1
1998	331/631	Cotton & MMF Gloves & Mittens	DPR	7784920	7730324.1	0.992987
1999	331/631	Cotton & MMF Gloves & Mittens	DPR	9120778	9120778.4	1
2000	331/631	Cotton & MMF Gloves & Mittens	DPR	1.06E+07	10561745	1
2001	331/631	Cotton & MMF Gloves & Mittens	DPR	1.06E+07	10267923	0.973166
2002	331/631	Cotton & MMF Gloves & Mittens	DPR	2747715	1508812	0.549115
2003	331/631	Cotton & MMF Gloves & Mittens	DPR	3962053	1456208.9	0.367539
2004	331/631	Cotton & MMF Gloves & Mittens	DPR	3716657	1421849.7	0.382561
1992	334/634	Other M&B cotton and MMF coats	DOZ	6541200	6541200	1
1993	334/634	Other M&B cotton and MMF coats	DOZ	7115729	5373409.5	0.755145
1994	334/634	Other M&B cotton and MMF coats	DOZ	7426539	5997514.5	0.807579
1995	334/634	Other M&B cotton and MMF coats	DOZ	9241412	6963307.5	0.75349
1996	334/634	Other M&B cotton and MMF coats	DOZ	9362300	8715907.5	0.930958
1997	334/634	Other M&B cotton and MMF coats	DOZ	9205704	7121214	0.773565
1998	334/634	Other M&B cotton and MMF coats	DOZ	1.23E+07	10242740	0.829831
1999	334/634	Other M&B cotton and MMF coats	DOZ	1.30E+07	13010882	1
2000	334/634	Other M&B cotton and MMF coats	DOZ	1.33E+07	12151176	0.914748
2001	334/634	Other M&B cotton and MMF coats	DOZ	2.14E+07	17412737	0.813117
2002	334/634	Other M&B cotton and MMF coats	DOZ	2.42E+07	22245428	0.920172
2003	334/634	Other M&B cotton and MMF coats	DOZ	2.73E+07	26630447	0.975774
1992	336/636	Cotton & MMF Dresses	DOZ	1.00E+07	9381917.6	0.935222
1993	336/636	Cotton & MMF Dresses	DOZ	1.21E+07	8639039.7	0.715614
1994	336/636	Cotton & MMF Dresses	DOZ	1.54E+07	11835526	0.770508
1995	336/636	Cotton & MMF Dresses	DOZ	1.41E+07	13226721	0.939638
1996	336/636	Cotton & MMF Dresses	DOZ	1.73E+07	15759919	0.912777
1997	336/636	Cotton & MMF Dresses	DOZ	1.73E+07	16131567	0.933601
1998	336/636	Cotton & MMF Dresses	DOZ	1.88E+07	17240824	0.915346
1999	336/636	Cotton & MMF Dresses	DOZ	1.84E+07	7362984.6	0.399599
2000	336/636	Cotton & MMF Dresses	DOZ	2.33E+07	19182251	0.823895
2001	336/636	Cotton & MMF Dresses	DOZ	2.56E+07	17012590	0.665267
2002	336/636	Cotton & MMF Dresses	DOZ	3.16E+07	26824559	0.847631
2003	336/636	Cotton & MMF Dresses	DOZ	2.98E+07	21127582	0.708673
2004	336/636	Cotton & MMF Dresses	DOZ	4.11E+07	32319945	0.786017

Source: US MFA/ATC Database [Brambilla, *et al.* (2007)].

Table A.1

Sample OTEXA Categories—Adjusted Base, Imports & Fill Rates (Continued)

Year	MFA Root	OTEXA Category Description	Native Units	Adjusted Base (SME)	Imports (SME)	Fill Rate
1992	338	M&B Knit Shirts, Cotton	DOZ	2.58E+07	25822104	1
1993	338	M&B Knit Shirts, Cotton	DOZ	2.45E+07	21908160	0.893081
1994	338	M&B Knit Shirts, Cotton	DOZ	2.79E+07	27890238	1
1995	338	M&B Knit Shirts, Cotton	DOZ	3.13E+07	31344468	1
1996	338	M&B Knit Shirts, Cotton	DOZ	3.17E+07	31693164	1
1997	338	M&B Knit Shirts, Cotton	DOZ	3.17E+07	31718982	1
1998	338	M&B Knit Shirts, Cotton	DOZ	3.41E+07	33052386	0.970578
1999	338	M&B Knit Shirts, Cotton	DOZ	3.68E+07	36774354	1
2000	338	M&B Knit Shirts, Cotton	DOZ	4.03E+07	40276782	1
2001	338	M&B Knit Shirts, Cotton	DOZ	4.44E+07	44392812	1
2002	338	M&B Knit Shirts, Cotton	DOZ	5.17E+07	51688488	1
2003	338	M&B Knit Shirts, Cotton	DOZ	5.64E+07	56447706	1
2004	338	M&B Knit Shirts, Cotton	DOZ	5.88E+07	58810998	1
1992	339	W&G Knit Shirts/Blouses, Cotton	DOZ	5965572	5965572	1
1993	339	W&G Knit Shirts/Blouses, Cotton	DOZ	6383160	5891052	0.922905
1994	339	W&G Knit Shirts/Blouses, Cotton	DOZ	7121862	7121862	1
1995	339	W&G Knit Shirts/Blouses, Cotton	DOZ	6753414	6753414	1
1996	339	W&G Knit Shirts/Blouses, Cotton	DOZ	8352198	8352198	1
1997	339	W&G Knit Shirts/Blouses, Cotton	DOZ	7526706	7440906	0.988601
1998	339	W&G Knit Shirts/Blouses, Cotton	DOZ	9045354	8537808	0.943889
1999	339	W&G Knit Shirts/Blouses, Cotton	DOZ	1.07E+07	10733376	1
2000	339	W&G Knit Shirts/Blouses, Cotton	DOZ	1.22E+07	12219480	1
2001	339	W&G Knit Shirts/Blouses, Cotton	DOZ	1.11E+07	10820190	0.972356
2002	339	W&G Knit Shirts/Blouses, Cotton	DOZ	1.59E+07	14536554	0.91195
2003	339	W&G Knit Shirts/Blouses, Cotton	DOZ	1.70E+07	16717866	0.982085
2004	339	W&G Knit Shirts/Blouses, Cotton	DOZ	1.80E+07	16278546	0.905849
1994	342/642	Cotton & MMF Skirts	DOZ	2571174	1685279.4	0.655451
1995	342/642	Cotton & MMF Skirts	DOZ	3619448	2781412.8	0.768463
1996	342/642	Cotton & MMF Skirts	DOZ	4401907	2625439.6	0.596432
1997	342/642	Cotton & MMF Skirts	DOZ	2780534	1119422.1	0.402593
1998	342/642	Cotton & MMF Skirts	DOZ	1275127	1275127.1	1
1999	342/642	Cotton & MMF Skirts	DOZ	5826571	2450260.3	0.420532
2000	342/642	Cotton & MMF Skirts	DOZ	5640335	3453909.4	0.612359
2001	342/642	Cotton & MMF Skirts	DOZ	7464006	3887454.7	0.520827
2002	342/642	Cotton & MMF Skirts	DOZ	7867513	3826543.5	0.486373
2003	342/642	Cotton & MMF Skirts	DOZ	8881696	2981951.9	0.335741
2004	342/642	Cotton & MMF Skirts	DOZ	1.13E+07	3799351	0.336536
1992	347/348	Cotton Trousers/Slacks & Shorts	DOZ	8402825	8402825.2	1
1993	347/348	Cotton Trousers/Slacks & Shorts	DOZ	8251858	8251858.4	1
1994	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.08E+07	9960694.7	0.924569
1995	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.16E+07	9468190.1	0.81285
1996	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.26E+07	12137749	0.963777
1997	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.36E+07	13165104	0.966842
1998	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.50E+07	13742717	0.916263
1999	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.65E+07	1621045.5	0.09812
2000	347/348	Cotton Trousers/Slacks & Shorts	DOZ	1.91E+07	19057681	1
2001	347/348	Cotton Trousers/Slacks & Shorts	DOZ	2.00E+07	19970932	1
2002	347/348	Cotton Trousers/Slacks & Shorts	DOZ	2.42E+07	24176427	1
2003	347/348	Cotton Trousers/Slacks & Shorts	DOZ	2.73E+07	27292881	1
2004	347/348	Cotton Trousers/Slacks & Shorts	DOZ	2.94E+07	29448628	1

Source: US MFA/ATC Database [Brambilla, *et al.* (2007)].

Table A.1

Sample OTEXA Categories—Adjusted Base, Imports & Fill Rates (Continued)

Year	MFA Root	OTEXA Category Description	Native Units	Adjusted Base (SME)	Imports (SME)	Fill Rate
1992	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	5277116	2973660	0.563501
1993	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	9276158	8252167.5	0.889611
1994	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.10E+07	9732690	0.883391
1995	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.14E+07	9906820.5	0.872117
1996	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.26E+07	11851097	0.938869
1997	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.35E+07	13277810	0.985685
1998	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.48E+07	14312109	0.964565
1999	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.63E+07	15460640	0.945955
2000	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.90E+07	19012371	1
2001	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	1.99E+07	19932657	1
2002	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	3.06E+07	26602512	0.86802
2003	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	3.59E+07	35853266	1
2004	351/651	Cotton & MMF Nightwear & Pajamas	DOZ	4.05E+07	40474967	1
1992	352/652	Cotton & MMF Underwear etc.	DOZ	4645995	4255873.8	0.916031
1993	352/652	Cotton & MMF Underwear etc.	DOZ	6092056	4878458.6	0.80079
1994	352/652	Cotton & MMF Underwear etc.	DOZ	7180246	4580138.6	0.63788
1995	352/652	Cotton & MMF Underwear etc.	DOZ	7483515	7414257.7	0.990745
1996	352/652	Cotton & MMF Underwear etc.	DOZ	8091173	7608504.7	0.940346
1997	352/652	Cotton & MMF Underwear etc.	DOZ	8413573	7877422.1	0.936276
1998	352/652	Cotton & MMF Underwear etc.	DOZ	9970725	9210810.8	0.923786
1999	352/652	Cotton & MMF Underwear etc.	DOZ	9412245	8220331.9	0.873366
2000	352/652	Cotton & MMF Underwear etc.	DOZ	1.29E+07	12293112	0.953438
2001	352/652	Cotton & MMF Underwear etc.	DOZ	1.36E+07	13600364	1
2002	352/652	Cotton & MMF Underwear etc.	DOZ	1.72E+07	16746916	0.972925
2003	352/652	Cotton & MMF Underwear etc.	DOZ	2.02E+07	19128188	0.944741
2004	352/652	Cotton & MMF Underwear etc.	DOZ	2.29E+07	22856951	1
1991	360	Cotton Pillowcases	NO	1391385	1391384.7	1
1992	360	Cotton Pillowcases	NO	1659218	1574308.8	0.948826
1993	360	Cotton Pillowcases	NO	1592996	1592996.4	1
1994	360	Cotton Pillowcases	NO	1924688	1902252.6	0.988344
1995	360	Cotton Pillowcases	NO	2080972	2073618.9	0.996467
1996	360	Cotton Pillowcases	NO	3680633	3378957.3	0.918037
1997	360	Cotton Pillowcases	NO	4413190	4187838.6	0.948937
1998	360	Cotton Pillowcases	NO	4840267	4840266.6	1
1999	360	Cotton Pillowcases	NO	5736731	5736731.4	1
2000	360	Cotton Pillowcases	NO	6014405	6014404.8	1
2001	360	Cotton Pillowcases	NO	6624866	6624865.8	1
2002	360	Cotton Pillowcases	NO	7668605	7668604.8	1
2003	360	Cotton Pillowcases	NO	9081286	9081286.2	1
2004	360	Cotton Pillowcases	NO	9454337	9454337.1	1
1991	361	Cotton Sheets	NO	1.15E+07	11460452	1
1992	361	Cotton Sheets	NO	1.30E+07	12950309	1
1993	361	Cotton Sheets	NO	1.24E+07	12433444	1
1994	361	Cotton Sheets	NO	1.45E+07	14460732	1
1995	361	Cotton Sheets	NO	1.56E+07	15634939	1
1996	361	Cotton Sheets	NO	2.29E+07	18597389	0.811838
1997	361	Cotton Sheets	NO	2.78E+07	25280960	0.909474
1998	361	Cotton Sheets	NO	3.44E+07	33095868	0.962913
1999	361	Cotton Sheets	NO	3.85E+07	38541344	1

Source: US MFA/ATC Database [Brambilla, *et al.* (2007)].

Table A.1

Sample OTEXA Categories—Adjusted Base, Imports & Fill Rates (Continued)

Year	MFA Root	OTEXA Category Description	Native Units	Adjusted Base (SME)	Imports (SME)	Fill Rate
2000	361	Cotton Sheets	NO	4.04E+07	40406844	1
2001	361	Cotton Sheets	NO	4.45E+07	44508136	1
2002	361	Cotton Sheets	NO	5.01E+07	50126669	1
2003	361	Cotton Sheets	NO	5.62E+07	56164092	1
2004	361	Cotton Sheets	NO	6.01E+07	60097534	1
1991	363	Cotton Terry & Other Pile Towels	NO	1.17E+07	11689698	1
1992	363	Cotton Terry & Other Pile Towels	NO	1.47E+07	14710422	1
1993	363	Cotton Terry & Other Pile Towels	NO	1.38E+07	13844720	1
1994	363	Cotton Terry & Other Pile Towels	NO	1.54E+07	15357094	1
1995	363	Cotton Terry & Other Pile Towels	NO	1.62E+07	16230249	0.998919
1996	363	Cotton Terry & Other Pile Towels	NO	1.76E+07	17588729	1
1997	363	Cotton Terry & Other Pile Towels	NO	1.86E+07	18594367	1
1998	363	Cotton Terry & Other Pile Towels	NO	1.98E+07	19793857	1
1999	363	Cotton Terry & Other Pile Towels	NO	2.10E+07	20999250	1
2000	363	Cotton Terry & Other Pile Towels	NO	2.25E+07	22521696	1
2001	363	Cotton Terry & Other Pile Towels	NO	2.42E+07	24154519	1
2002	363	Cotton Terry & Other Pile Towels	NO	2.64E+07	26403174	1
2003	363	Cotton Terry & Other Pile Towels	NO	2.88E+07	28834247	1
2004	363	Cotton Terry & Other Pile Towels	NO	2.97E+07	29271308	0.984514
1991	369	Shop Towels Only	KG	3688660	3688660	1
1992	369	Shop Towels Only	KG	4165145	4165144.5	1
1993	369	Shop Towels Only	KG	4456703	4456703	1
1994	369	Shop Towels Only	KG	4456703	4256052	0.954978
1995	369	Shop Towels Only	KG	5155888	4682446	0.908175
1996	369	Shop Towels Only	KG	5675884	5675883.5	1
1997	369	Shop Towels Only	KG	6144047	6144046.5	1
1998	369	Shop Towels Only	KG	6780552	6780552	1
1999	369	Shop Towels Only	KG	7363168	733167.5	0.099572
2000	369	Shop Towels Only	KG	8096709	8096709	1
2001	369	Shop Towels Only	KG	8918523	8918523	1
2002	369	Shop Towels Only	KG	1.01E+07	10080558	1
2003	369	Shop Towels Only	KG	1.14E+07	11379970	1
2004	369	Shop Towels Only	KG	1.21E+07	12131115	1
1991	615	MMF Print Cloth Fabric	M2	1.42E+07	14187864	1
1992	615	MMF Print Cloth Fabric	M2	1.49E+07	14935279	1
1993	615	MMF Print Cloth Fabric	M2	1.76E+07	13794085	0.78531
1994	615	MMF Print Cloth Fabric	M2	2.00E+07	13475023	0.673025
1995	615	MMF Print Cloth Fabric	M2	1.78E+07	10141540	0.569823
1996	615	MMF Print Cloth Fabric	M2	1.94E+07	14184923	0.730959
1997	615	MMF Print Cloth Fabric	M2	2.56E+07	22730616	0.889082
1998	615	MMF Print Cloth Fabric	M2	2.56E+07	25632933	1
1999	615	MMF Print Cloth Fabric	M2	2.87E+07	26963151	0.940312
2000	615	MMF Print Cloth Fabric	M2	2.83E+07	26330205	0.929341
2001	615	MMF Print Cloth Fabric	M2	3.79E+07	37853501	1
2002	615	MMF Print Cloth Fabric	M2	3.83E+07	36837156	0.962278
2003	615	MMF Print Cloth Fabric	M2	3.77E+07	27696697	0.735485
2004	615	MMF Print Cloth Fabric	M2	4.90E+07	25816627	0.527164

Source: US MFA/ATC Database [Brambilla, *et al.* (2007)].

Table A.1

Sample OTEXA Categories—Adjusted Base, Imports & Fill Rates (Continued)

Year	MFA Root	OTEXA Category Description	Native Units	Adjusted Base (SME)	Imports (SME)	Fill Rate
1991	638/639	MMF KN Shirts & Blouses	DOZ	1796113	626356.8	0.348729
1992	638/639	MMF KN Shirts & Blouses	DOZ	981007.2	981007.2	1
1993	638/639	MMF KN Shirts & Blouses	DOZ	1517175	1219419.4	0.803743
1994	638/639	MMF KN Shirts & Blouses	DOZ	520253.3	520253.28	1
1995	638/639	MMF KN Shirts & Blouses	DOZ	1429216	1429215.8	1
1996	638/639	MMF KN Shirts & Blouses	DOZ	976212	976212	1
1997	638/639	MMF KN Shirts & Blouses	DOZ	1228789	1228789.4	1
1998	638/639	MMF KN Shirts & Blouses	DOZ	2448157	860764.32	0.351597
1999	638/639	MMF KN Shirts & Blouses	DOZ	3260684	3252.96	0.000998
2000	638/639	MMF KN Shirts & Blouses	DOZ	4240629	4240628.6	1
2001	638/639	MMF KN Shirts & Blouses	DOZ	2368803	1903253.8	0.803467
2002	638/639	MMF KN Shirts & Blouses	DOZ	4843048	3232677.6	0.667488
2003	638/639	MMF KN Shirts & Blouses	DOZ	6378536	6378536.2	1
2004	638/639	MMF KN Shirts & Blouses	DOZ	8429119	6944680.8	0.823892
1996	666	MMF Pillowcases ex. Bolsters	KG	7456867	7456867.2	1
1997	666	MMF Pillowcases ex. Bolsters	KG	1.13E+07	11178763	0.991541
1998	666	MMF Pillowcases ex. Bolsters	KG	1.24E+07	12432586	1
1999	666	MMF Pillowcases ex. Bolsters	KG	1.47E+07	14678395	1
2000	666	MMF Pillowcases ex. Bolsters	KG	1.24E+07	12418099	1
2001	666	MMF Pillowcases ex. Bolsters	KG	1.70E+07	17020152	1
2002	666	MMF Pillowcases ex. Bolsters	KG	1.56E+07	15551554	1
2003	666	MMF Pillowcases ex. Bolsters	KG	1.85E+07	18517118	1
2004	666	MMF Pillowcases ex. Bolsters	KG	1.99E+07	19867450	1
1996	666	MMF Sheets	KG	3.43E+07	34322674	1
1997	666	MMF sheets	KG	5.74E+07	54240566	0.944143
1998	666	MMF Sheets	KG	6.68E+07	66772613	1
1999	666	MMF Sheets	KG	6.89E+07	68866315	1
2000	666	MMF Sheets	KG	7.72E+07	77178125	1
2001	666	MMF Sheets	KG	7.25E+07	72539179	1
2002	666	MMF Sheets	KG	8.94E+07	89401234	1
2003	666	MMF Sheets	KG	9.80E+07	98031859	1
2004	666	MMF Sheets	KG	1.02E+08	1.02E+08	1

Source: US MFA/ATC Database [Brambilla, *et al.* (2007)].

APPENDIX B

REVIEW OF OLLEY AND PAKES AND LEVINSOHN AND PETRIN

This section provides a review of the techniques of Olley and Pakes and Levinsohn and Petrin. Consider the following Cobb-Douglas production function:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \omega_{it} + \epsilon_{it}. \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \quad (B.1)$$

y_{it} is the log of output, k_{it} is the log of capital input, and l_{it} is the log of labour input. The OP methodology allows the error term to have two components, a white noise component and a time-varying productivity shock. There are two terms in this equation that are unobservable to the econometrician, ω_{it} and ϵ_{it}. ϵ_{it} represents shocks that are not observable by firms before making their input decisions. On the contrary, ω_{it} represents shocks that are potentially expected by firms when they make input decisions. ϵ_{it} can

also represent measurement error in the output variable. We will refer to ω_{it} as the 'productivity shock' of firm i in period t [Ackerberg, *et al.* (2005)]. It is assumed that ω_{it} follows a first order Markov process and capital is accumulated by means of a deterministic dynamic investment process:

$$p(\omega_{it+1}| I_{it}) = p(\omega_{it+1} |\omega_{it}),$$

where I_{it} is firm i's information set at t. Current and past realisations of ω, i.e. (ω_{it}, ..., ω_{i0}) are assumed to be a part of I_{it}. OP assumes that labour is a non-dynamic input. This investment adds to future capital stock deterministically:

$$k_{it} = \kappa(k_{it-1}, i_{it-1}).$$

In view of the fact that k_{it} is decided at $t{-}1$, the above assumptions entail that it must be uncorrelated with the unexpected innovation in ω_{it} between $t{-}1$ and t. This orthogonality will be used to form a moment to spot β_k. Unlike capital, l_{it} is decided at t and, consequently, correlated with the innovation component of ω_{it}. Considering the firm's dynamic decision of investment level, i_{it}, OP state conditions under which a firm's optimal investment level is strictly an increasing function of their current productivity, ω_{it}, i.e.

$$i_{it} = f_t(\omega_{it}, k_{it}). \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \text{ (B.2)}$$

Profit maximisation generates an investment demand function that is determined by two state variables, capital and productivity. The reason f is indexed by t is the assumption that variables such as input prices, are allowed to vary across time but not across firms [Ackerberg, *et al.* (2006)]. If the investment demand function is monotonically increasing in productivity, it is feasible to invert the investment function and get an expression for productivity as a function of capital and investment [Pakes (1994)]:

$$\omega_{it} = f_t^{-1}(i_{it}, k_{it}). \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \text{ (B.3)}$$

The heart of OP is to make use of this inverse function to control for ω_{it} in the production function:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + f_t^{-1}(i_{it}, k_{it}) + \epsilon_{it}. \qquad \dots \qquad \dots \qquad \dots \qquad \dots \text{ (B.4)}$$

The first stage of OP is to estimate this equation. f is the solution to a complex dynamic programming problem. To avoid the computationally demanding assumptions, OP treats f_t^{-1} non-parametrically [Ackerberg, *et al.* (2006)]. Given this non-parametric treatment, direct estimation of (B.4) does not identify β_k, as k_{it} is collinear with the non-parametric function. Nevertheless, one does find an estimate of the labour coefficient β_l, and of the composite term $\beta_k k_{it} + f_t^{-1}(i_{it}, k_{it})$, which we denote by $\widehat{\Phi}_{it}$. By the timing assumptions regarding capital, we can write:

$$\omega_{it} = E[\omega_{it} |I_{it-1}] + \xi_{it} = E[\omega_{it} |\omega_{it-1}] + \xi_{it},$$

where ξ_{it} is orthogonal to k_{it}, i.e. $E[\xi_{it} |k_{it}] = 0$. This is the moment which OP uses to identify the capital coefficient. To operationalise this process by GMM, given a guess at the capital coefficient β_k, one can 'invert' out the ω_{it}'s in all periods:

$$\omega_{it}(\beta_k) = \widehat{\Phi}_{it} - \beta_k k_{it}.$$

Given these $\omega_{it}(\beta_k)$'s, one can compute ξ_{it}'s in all periods by non-parametrically regressing $\omega_{it}(\beta_k)$'s on $\omega_{it-1}(\beta_k)$'s and taking the residual, i.e.

$$\xi_{it}(\beta_k) = \omega_{it}(\beta_k) - \widehat{\psi}(\omega_{it-1}(\beta_k)),$$

where $\widehat{\psi}(\omega_{it-1}(\beta_k))$ are predicted values from the non-parametric regression. Treating the regression of ω_{it} on ω_{it-1} non-parametrically allows for ω_{it} to follow an arbitrary first-order Markov process. These $\xi_{it}(\beta_k)$'s can subsequently be used to establish:

$$\frac{1}{T}\frac{1}{N}\sum_t \sum_i \xi_{it}(\beta_k) \cdot k_{it}$$

In a GMM procedure, β_k would be estimated by setting this empirical analogue as close as possible to zero [Ackerberg, *et al.* (2005)]. LP adopts a similar approach to solving the endogeneity problem. Instead of using an investment demand equation, they use an intermediate input demand function to invert out ω_{it}. In the real data, investment is often lumpy. This may not be in line with the strict monotonicity assumption regarding investment. Also, OP procedure can cause efficiency loss in a data with zero investment. Given that the intermediate input demands normally exhibit a lesser tendency to have zeros, the strict monotonicity condition is expected to hold in the LP methodology. LP considers the following production function:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + \omega_{it} + \epsilon_{it},$$

where m_{it} is an intermediate input, such as electricity. LP considers the following intermediate input demand function:

$$m_{it} = f_t(\omega_{it}, k_{it}). \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \text{(B.5)}$$

First, the intermediate input at t is chosen as a function of ω_{it}. Secondly, l_{it} is also taken to be a 'perfectly variable' input. If l_{it} was chosen before m_{it}, then it would influence the firm's optimal choice of m_{it}. Under the assumption that intermediate input demand (B.5) is monotonic in ω_{it}, we can invert:

$$\omega_{it} = f_t^{-1}(m_{it}, k_{it}). \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \text{(B.6)}$$

And substitute this in the production function to get:

$$y_{it} = \beta_k k_{it} + \beta_l l_{it} + \beta_m m_{it} + f_t^{-1}(m_{it}, k_{it}) + \epsilon_{it}. \qquad \ldots \qquad \ldots \qquad \ldots \text{(B.7)}$$

The first step of the LP estimates β_l using the above equation, treating f_t^{-1} non-parametrically. Once more, β_k and β_m are not identified as k_{it} and m_{it} are collinear with the non-parametric term. One also obtains an estimate of the composite term, in this case $\beta_k k_{it} + \beta_m m_{it} + f_t^{-1}(m_{it}, k_{it})$. In the second stage, there is one more parameter to estimate, β_m. LP uses the same moment condition as OP to identify the capital coefficient [Ackerberg, *et al.* (2005)]. $\xi_{it}(\beta_k, \beta_m)$ can be constructed as the residual from a non-parametric regression of $(\omega_{it}(\beta_k, \beta_m) = \widehat{\Phi}_{it} - \beta_k k_{it} - \beta_m m_{it})$ on $(\omega_{it-1}(\beta_k, \beta_m) = \widehat{\Phi}_{it-1} - \beta_k k_{it-1} - \beta_m m_{it-1})$. They include a further moment to identify β_m, i.e. the condition that $\xi_{it}(\beta_k, \beta_m)$ is orthogonal to m_{it-1}. This results in the following moment condition:

$$E[\xi_{it}(\beta_k, \beta_m) | \begin{matrix} k_{it} \\ m_{it-1} \end{matrix}] = 0$$

ξ_{it} is not orthogonal to m_{it} because ω_{it} is observed at the time that m_{it} is chosen, and ξ_{it} should be uncorrelated with m_{it-1}, as m_{it-1} was chosen at t–1 [Ackerberg, *et al.* (2006)].

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ICT Operational Risk Management (ORM) and Performances of a Financial SME

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This paper investigates the relationship between ICT operational risk management (ORM) and the performance of an SME. To achieve this, this research investigated five specific elements, namely: the principal causes of ICT ORM failure in an SME; change management requirements; characteristic(s) of business information; challenges posed by new ORM solutions; and evaluation models for understanding the value of ICT ORM in SMEs. Following a literature review, an electronic survey consisting of closed ended questions was developed. This was distributed at a financial company in the Eastern Cape and 107 responses were gathered. Factor analysis was used as a data reduction technique to reduce the large number of related variables to a more manageable number. The empirical evidence presented indicated that a significant proportion of the aforementioned variables have impact on the performance of an SME. Therefore, this paper indicates that there is a strategic impact of ICT ORM on SME performance.

Keywords: SME Performance, Operational Risk Management, Information Communication Technology

1. INTRODUCTION

The need for ICT Operational Risk Management (ORM) in Small and Medium Enterprises (SMEs) has been described substantially in existing literature [ITGI (2013)]. Additionally, a few empirical studies have shown the association between ICT ORM and performance in an SME [ITGI (2013)]. Those studies found that good ICT ORM in SMEs can generally improve performance. However, there are other studies which empirically suggest the existence of indirect relationships between ICT ORM and SME performance [Anderson and Choobineh (2008)].

This paper investigates the relationship between ICT ORM and the performance of an SME by considering five elements, namely: the principal causes of ICT ORM failure in an SME; change management requirements; characteristic(s) of business information; challenges posed by new ORM solutions; and evaluation models for understanding the value of ICT ORM in SMEs. Therefore, it investigates ORM adoption in an Eastern Cape SME. The objective is to examine one Eastern Cape business to study the ORM impact on the SME.

It is important to note that the study adopted a common industry definition of operational risk, namely "the risk of direct or indirect loss resulting from inadequate or

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failed internal processes, people and systems or from external events" [Basel Committee on Banking Supervision (2004:2)]. Noting that several categorisations of IT risk have been proposed, for the purpose of this study, the researcher adopts and adapts those made by the IT Governance Institute [Basel Committee on Banking Supervision (2004)]. IT risk has been categorised as the solution delivery/benefit realisation risk, associated with the contribution of IT to new or improved business solutions, usually in the form of projects and programmes [ITGI (2009:11)]. It is important to note that this categorisation "focuses on the causes of operational risk which is appropriate for both risk management and, ultimately measurement" [Basel Committee on Banking Supervision (2004:2)]. Consequently, this study sets out further details on the effects of operational related IT risk.

Before investigating the impact of ICT ORM on SME performance, it is prudent to provide a definition of an SME to ensure common understanding of this research context. "SME" stands for small and medium-sized enterprises—as defined in EU law. The main factors determining whether a company is an SME are (1) number of employees, and (2) either turnover or balance sheet total [Verheugen (2003)]. Table 1 (below) shows the thresholds (in terms of employees and turnover) for the classification of a company as medium, small or micro.

Table 1

The New Thresholds[1](24:14)

Company Category	Employees	Turnover
Medium-sized	<250	≤ € 50 m
Small	<50	≤ € 10 m
Micro	<10	≤ € 2 m

It has been argued that for competition and merger analysis of SMEs, it is important to know the effects of market concentration and past merger on an institution's efficiency [National Credit Regulator (2008)]. Additionally, the National Credit Regulator (2008) found that ICT ORM activities contribute significantly to enhancing the efficiency of SMEs. Here, they argue that ICT ORM are activities that may be used to improve SMEs efficiency.

Furthermore, efficiency is seen to have positive effects on interest rate risk capitalisation but a mixed result on the effect of ICT operational risk in SMEs [National Credit Regulator (2008)]. Standing, Guilfoyle, Lin and Love (2007) indicate that profit efficiency is sensitive to ICT operational and insolvency risks, but not to liquidity risk or to a mix of loan products in SMEs. Hence, it is expected that by managing these risks, the institution's efficiency can be improved. Thus, from the literature, it is expected that ICT operational risk in SMEs' practices is associated with the level of efficiency and performance of SMEs.

The next section of this paper reviews related research in terms of ICT Trends in Financial SMEs. This is followed by a discussion of Information Technology Risk Management (ITRM) leading to the description of the main research objective of this

[1]Verheugen (2003).

paper. The key areas of the paper, namely the method followed for data collection, description and analysis of the findings and recommendations based on the findings form the concluding sections of the paper.

2. RELATED RESEARCH: ICT TRENDS IN FINANCIAL SMEs

Although ICT operational risk in SMEs is one of the key functions of financial institutions, very little has been done to date to link ICT operational risk in SMEs with performance [Basel II (2004)]. As discussed previously, efficiency and ICT operational risk have been linked in previous studies, thus it is prudent to consider the link between ICT ORM and performance in an SME.

However, conceptually, the objectives of ICT operational risk in SMEs that provide relationships between ICT ORM and SME performance have been amply discussed [Basel II (2004)]. While directors see ICT operational risk in SMEs as critical, there is real concern that ICT ORM in SMEs is less focused, thus detracting from business performance. Furthermore, Liebenberg and Hoyt (2003) researched a sample of firms[2] that signalled their use of ICT ORM in SMEs by appointing a Chief Information Officer (CIO) and found that firms with greater financial leverage are more likely to appoint a CIO.

These findings are consistent with the hypothesis that firms appoint CIOs in order to reduce information asymmetry with regard to the firm's current and expected risk profile, noting that this is particularly true for large firms. Liebenberg and Hoyt (2003) provide further evidence that financial institutional investment in ICT ORM in SMEs during the 1990s helped reduce earnings and loss volatility during the 2001 recession.

A recent study by Sholes (2007) used a hazard model to examine the factors that influence the SME level of ICT use. They found that firms which were more levered, had more volatile earnings and poorer stock performance, were more likely to initiate an ICT programme [Sholes (2007)]. The author for this reason believes that firms facing greater risk of financial distress may benefit from ICT when it reduces the chance of costly outcomes [Sholes (2007)]. Also, it turns out that firms having greater risk of financial distress, that is those with more leverage and less financial slack, are more likely to adopt ICT [Layton (2007)]. In addition, there are many studies looking at profitability and its various determinants including operational risk factors [Layton (2007)].

A number of empirical studies show that ICT operational risk in SMEs is part of the profitability determinants [King III Report (2009); Curley (2004); Yeo (2002)]. Hence, it is expected that by managing these risks well, SME profitability is likely to increase. As the survival and success of SMEs depends on their efficiency to manage risks, ICT operational risk in SMEs is one of the critical factors in providing better returns to shareholders. Related to ICT operational risk, the next section describes Information Technology Risk Management.

3. INFORMATION TECHNOLOGY RISK MANAGEMENT

Recent studies on information technology risk management (ITRM) in large organisations have witnessed ideal benefits. Research suggests that ITRM can be used to

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[2]In this study the words firms organisation, institution and business are used interchangeably.

understand organisational operations and change management [Smith and Kruger (2010)]. One study suggests that information technology (IT) risk is business risk, which is defined and operationalised as:

> "…business risk associated with the use, ownership, operation, involvement, influence and adoption of IT within an enterprise. It consists of IT-related events that can potentially impact the business. It includes both uncertain frequency and magnitude, and it creates challenges in meeting strategic goals and objectives as well as uncertainty in the pursuit of opportunities" [ITGI (2009:11)].

In contrast, the success of ITRM models and theories in large organisations has shifted focus towards small business enterprises (SMEs) [Basel Committee on Banking Supervision (2004)]. Smith and Kruger (2010:1) point out that "…… despite these theoretical explanations there is still a shortage of reliable quantitative models that can provide enough information to analyze IT security investments," particularly in SMEs.

One of the reasons attributable to the shift in paradigm as suggested by researchers and practitioners of ITRM is that it serves as a new venue of improved services and potential benefits for SMEs [Gerber and Von Solms (2005)]. Additionally, Standing, Guilfoyle, Lin, and Love (2007:1156) identified no main effects "…using project outcome (success and failure) as the repeated measure and job responsibility (IT support, line and executive managers) as the independent factor…". However, a significant interaction effect for outcome by responsibility, $F(2, 102)= 4.45$, $p< .05$ was determined. When a post hoc analysis (Tukeys HSD and single degree of freedom F ANOVA) was conducted, it revealed that "… IT support workers attributed themselves significantly more to IT project success (mean=0.34) than to IT project failure (mean= 0.33), $F(1, 28)= 5.10$, $p< .05$)" [Standing, Guilfoyle, Lin, and Love (2007:1156)]. The reverse was true for executive managers, who took more responsibility for their project failure than their project successes ($p= 0.08$) [Standing, Guilfoyle, Lin, and Love (2007:1156)].

Yet, a number of studies have suggested that small businesses have not shown much interest in ITRM, particularly ORM [Lam (2006)]. A review of literature indicates that ORM, a variation of ITRM, provides a structural form of activities and has become a popular vehicle for risk management of information in the financial and manufacturing industries [ITGI (2007)]. In addition, Standing, Guilfoyle, Lin, and Love (2007) highlighted that as a rising management discipline, interest and current development of institutional risk management (IRM) varied across industries and institutions. This suggests that ORM is a tool that can be used to evaluate models for understanding the value of IT and for streamlining a company's operations. In support of this view, another study acknowledged that "operational procedures and responsibilities are required to ensure the correct and secure operation of information processing facilities" [Owen (2009:32)].

ORM emerged in the late 1960s when manufacturing companies started looking for ways to alleviate delivery delays that resulted from large volumes of products and services. The use of ORM, however, became popular in the late 1980s and early 1990s [Sholes (2007)]. Currently, many large organisations in the United States of America, Canada, and Europe use ORM to support their IT financial and trading activities. The adoption of ORM has also progressed rapidly in Australia [Lam (2006)].

There is an indication that the growing use of ORM has garnered attention in academic literature. A number of success stories published in recent years claim to have received a variety of benefits by adopting ORM, while several other studies also confirmed benefitting to some extent [Calder (2006)].

Nonetheless, in the past, considerable research on ORM was conducted for large businesses; whereas, studies on SMEs in this respect is more or less a recent phenomenon [ITGI (2009)]. Additionally, the majority of these studies are confined to the USA, Canada and Europe. Research on ORM adoption in developing countries like South Africa (SA) remains marginal. Only a limited number of empirical studies have been undertaken in the Eastern Cape, South Africa (SA). Recently, studies have investigated the use of information technology (IT) among SMEs, but their objectives deviate from Eastern Cape SMEs [Owen (2009)]. With this background in mind, the next section describes the research objective of this paper.

4. RESEARCH OBJECTIVE

Building on prior research related to: (1) impact of information communication technology (ICT) and (2) operational risk management (ORM) in the context of SMEs, the focus of this study was to investigate the relationship between: (1) ICT operational risk management (ORM) and (2) performances of SMEs. To remain focussed, the research investigated five specific objectives which were:

(1) Analysing the principal causes of ICT ORM failure in an SME.
(2) Assessing the change management requirements for building successful ICT systems in SMEs.
(3) Identifying characteristic(s) of business information which play a major role in supporting an organisation's business operations.
(4) Identifying the challenges posed by ICT ORM new solutions and finally.
(5) Evaluating models for understanding the value of ICT ORM in SMEs.

The following section describes the research design used to achieve these objectives.

5. RESEARCH DESIGN

In view of these objectives this research adopted a positivist paradigm which enabled the researcher to adopt a survey design for the unit of analysis, using a case study as the site. The research paradigm refers to the philosophy of the research process [Pallant (2005)]. This includes the assumption and values that serve as a rationale for research and the criteria the researcher uses for interpreting data and reaching conclusions [Pallant (2005)].

The study was conducted in two phases: one phase followed a case study design, the other, a survey using a questionnaire. The 'case' in this study was a financial company in the Eastern Cape. All units within this case form part of the case (managers, implementers, directors, etc.). The motive for using a case study was to understand the complexity of such an organisation. This enriches experience and fortifies what is already known through previous research.

5.1. Instrumentation

The questionnaire was adapted and administered online electronically. This research instrument consisted of six sections. First, the research instrument sought information about basic demographics [Fidell (2009)]. In order to address the objective of this research, the sections that followed addressed each of the components described previously. Thus, one of the parts addressed the principal causes of ORM failure in SME; another addressed the change management requirements for building successful systems, risk monitoring and reporting of ORM in SME [Fidell (2009)]. Next were characteristic(s) of business information and this was followed by the challenges posed by new ORM solutions and evaluation models for understanding the value of ICT in SME. This was done by identifying the traditional and modern capital budgeting models and how their drivers affected business processes. At the outset, the ICT adoption was measured on a four-point Likert scale. For sample size calculation, Fidell (2009) recommended a formula which takes into account the number of independent variables that a researcher wishes to use; $N \geq 50 + 8m$ (m= number of independent variables). Due to the objectives posed, questionnaires were sent to a minimum of N=90 respondents of the SME according to a simple random sampling plan. A total of 107 responses were received.

5.2. Data Analysis and Interpretation

The components of ORM ICT measuring the influence on SMEs were subjected to Factor Analysis i.e. (FA)—principal component analysis. This approach was used as it is a popular method of data reduction in social science research, and ICT research increasingly considered as belonging to this category of research [Osborne and Costello (2004)]. Five components were eventually retained in the analysis. The items that cluster on the same components[3] suggest that component 1 represents *X*, component 2 *Y*, component 3 *Z*, component 4 *K* and component 5 *L*. These components equate to the secondary objectives described previously.

Factor analysis was used as the data reduction technique [Fidell (2009)]. For this reason, it was used to reduce a large number of related variables (cf. Table 2: KMO and Bartlett's Test and Table 3: Factor loadings after rotation: Component Matrix) to a more manageable number, prior to using them in other analyses such as multiple regression or multivariate analysis of variance (MANOVA) [Fidell (2009)].

One of the objectives of this study was to find the factors that predict ICT operational risk within SMEs. Multi-item constructs were used to capture information about different variables to adopt ICT operational risk. A multi-item construct of the instrument was used. A construct was used to measure five main support items. The items were adapted to literature and research questions.

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[3]X- principal causes of ORM failure related to ICT.
 Y- change management requirements and ICT Risk.
 Z- characteristic(s) of information influences ICT Risk.
 K-challenges posed by ORM solutions.
 L-evaluation models affecting ICT adoption within SMEs.

6. RESEARCH FINDINGS

6.1. Data Reduction Technique: Factor Analysis

Factor Analysis (FA) as a technique was designed not to test hypothesis(es) or tell whether a measure is significantly different from another. Instead, it was added as a data reduction technique. Consequently, FA sought to answer the question 'what is the underlying factor structure of ORM ICT measures that influence SMEs as proposed by the current study's instrument'? The items of ORM ICT measuring the influence of SME were subjected to FA—principal component analysis (PCA)—using SPSS version 18.

Prior to performing the PCA, the suitability of data for FA was assessed. The inspection of the correction matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer value was acceptable (cf. Table 2), exceeding the recommended value of .6 [Pallant (2005)] and the Barlett's test of sphericity [Pallant (2005)] reached statistical significance, supporting the factorability of the correlation of the matrix.

A PCA was conducted on 24 items with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin (KMO) measure as aforementioned verified the sampling adequacy for the analysis, KMO = .61 [Fidell (2009)], and all KMO values for individual items were > .70, which is well above the acceptable limit of .5 [Fidell (2009)] (cf. Table 2: KMO and Bartlett's Test). As mentioned earlier, the Barlett's test of sphericity $X2$ (276) = 783.39, p = .000, indicated that correlations between items were significantly large for PCA, which was satisfactory (cf. Table 2: KMO and Bartlett's Test).

Table 2

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.612
Bartlett's Test of Sphericity	Approx. Chi-Square	783.393
	Df	276
	Sig.	.000

An initial analysis was run to obtain eigenvalues of each component in the data. Five components had eigenvalues over Kaiser's criterion of 1 and in combination explained 65.97 percent of the variance. The scree plot showed inflexions that would justify retaining the five components. Given the large sample size, and the convergence of the scree plot on five components, this was the number of components retained in the final analysis [Fidell (2009)]. Table 3 shows the factor loadings after rotation. The items that cluster on the same components suggest that component 1 represents X, component 2 Y, component 3 Z, component 4 K and component 5 L (cf. Table 3: Factor loadings after rotation: Component Matrix).

Table 3

Factor Loadings after Rotation: Component Matrix

	Component				
	1	2	3	4	5
Q7	.718				
Q8	.711				
Q9	.701				
Q10	.655				
Q11	.584				
Q12		.583			
Q13		.514			
Q14		.499			
Q15		.427			
Q16			.640		
Q17			−.519		
Q18			.327		
Q19			301		
Q20			.333		
Q21				.454	
Q22				−.402	
Q23				−525	
Q24				.400	
Q25					.460
Q26					.425
Q27					.402
Q28					.602
Q29					.505
Q30					.331

Extraction Method: Principal Component Analysis.

The next section addresses a discussion of the research findings presented above.

6.2. Analysis and Discussion of Findings

This section addresses factor analysis—data reduction, determining the factors for principal causes of ORM failure related to ICT, organisational factors related to change management requirements and ICT risk, characteristic(s) of information having influence on ICT risk, challenges posed by ORM solutions, and evaluation models affecting ICT adoption within SMEs, and ICT operational risk and SMEs performance.

6.2.1. *Factor Analysis—Data Reduction*

One hundred and seven questionnaires were received and analysed using SPSS version 18. The data showed that about 60.7 percent of the respondents were IT personnel, about 23.4 percent finance and 10.3 percent operations staff. The study identified various factors of ICT operational risk in SMEs adoption within the case organisation.

Under principal causes of IT failure, the current study revealed that A[4] was significant in determining the ICT operational risk in SMEs adoption. In other factors studied, A was the only significant ICT operational risk that affected SMEs. Thus, SMEs need to adopt A for ICT operational SMEs, since they would be provided with benefits that could be accomplished through ICT operation.

Although the principal causes of ORM failure related to ICT are important, so too are (1) change management requirements; (2) challenges posed by ORM solutions; and (3) evaluation models. Further emphasis on the relative importance of these variables over others showed that A[5] does have a significant impact on change management requirements. This further indicates that management of SMEs must focus on A for ICT operational risk benefits compared with the other factors, to gear up the adoption process.

Additionally, it explained around half of the percentages of ICT operational risk in SMEs adoption variance. Based upon the results, the current study proposes that in order to obtain the full benefits from ICT operational risk, SMEs must adopt a pro-active approach and focus more on the potential benefits as aforementioned.

Building on prior research on ICT operational risk in SMEs and performances of financial institutions, this study suggests the relationship between ICT operational risk in SMEs and performances of SMEs. Specifically, the model developed shows the relationship between ICT ORM and the performance of SMEs.

ICT operational risk in SMEs in financial institutions is not a new phenomenon [Anderson and Choobineh (2008)]. Dealing with risk has always been the raison d'etre of institutions [National Credit Regulator (2008)]. For instance, financial institutions (SMEs) are in the risk business [National Credit Regulator (2008)]. Yeo (2002) argues that an integrated, holistic approach to ICT operational risk in SMEs can create shareholder value. Therefore, the effective management of ICT risk in SMEs is crucial to any financial institution's performance. In support of this, Standing, Guilfoyle, Lin, and Love (2007) describe ICT operational risk activities that are designed to minimise possible losses. Standing, Guilfoyle, Lin, and Love (2007) reveal that the purpose of ICT operations is to maximise revenues and offer the most value to shareholders by offering a variety of financial services, and especially by administering risks. Accordingly, ICT operations are central to SMEs.

The survival and success of financial organisations depend on the efficiency with which they can manage risks; hence, ICT operational risk in SMEs is one of the critical factors in providing better returns to the shareholders [Standing, Guilfoyle, Lin, and Love (2007)]. Also, it will depend to a large extent on how these institutions manage different risks arising from their operations [Standing, Guilfoyle, Lin, and Love (2007)]. This suggests that an effective and efficient ICT ORM in financial SMEs should have special importance as they have to cope with the challenges of globalisation. The findings and for that matter objectives of this current study are thus consistent with previous studies [King III Report (2009)]. The next section addresses individual factors of the five secondary objectives.

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[4]One of the principal causes of information system failure is insufficient or improper user participation in the systems development process.
[5]There is a high failure rate among enterprise application projects because they require extensive organisational change that is often resisted by members of the organisation.

6.2.2. *IT Operational Risk and SMEs Performance*

Both the current findings and reviewed literature show that performance of SMEs has significant importance in the variables studied. In fact, a previous study by King III (2009) examined the relationship between ICT and performance of financial institutions (SMEs) and found the relationship between capital structure and profitability to be of a mixed nature.

From the current study's results, particular sub variables of the five main categories emerge that have impact on performance of SMEs. However, as suggested by literature [Lam (2006)] the major reason noted for not establishing such ICT was the non-IT literacy of customers or the prohibitive costs quoted by consultants for setting up an ICT site. Although the study had identified a slower uptake of ICT usage within HR personnel, it was evident from responses that ICT development was a significant feature in the thinking of most operations in terms of future innovations. This result indicates that such development for SMEs is still viewed as an innovative product yet to be fully exploited.

The current study, and comparative studies conducted by the Basel Committee on Banking Supervision (2004), largely supports suggestions to adopt ICT operations within SMEs business strategies. The belief that ICT provides a potential transformational impact or a solution to key business issues and challenges provides an explanation for the overall level of strategic commitment by respondents.

6.3. Ensuring Reliability and Validity

The correlation provided directional support for predicted relationships and showed that collinearity among the independent variables was sufficient. The researcher ensured that the validity and reliability aspects of the instrument were carefully developed. The face and construct validity were ensured by developing from a thorough analysis of the literature. Collegial validity was ensured by giving the instrument to specialists in the field of IT risk management to check whether the constructs were represented correctly.

7. RECOMMENDATIONS

For methodological use, further research is needed adopting the methodology used in this study, that is factor analysis, and to monitor these changes more closely, to measure the changing strategies and the associated factors such as insufficient or improper user participation in the systems development process, identified as potential barriers to the effective adoption and implementation of ICT strategies. The methodology used in this study, that is factor analysis, can also be applied in different sectors of SMEs, to study either similar factors or the emerging factors other than the current study's variables.

In terms of ICT ORM practices in SMEs, one of the key barriers to the pace and success of adopting ICT operational risk management is insufficient or improper user participation in the systems. Managers need to take notice of this. Thus ICT operations managers of SMEs should instead look for: principal causes of ORM failure related to ICT, change management requirements and ICT risk, characteristic(s) of information

influences on ICT risk, challenges posed by ORM solutions and evaluation models affecting ICT adoption within SMEs to leverage the institution's performance.

8. CONCLUSION

The findings support similar studies and thus increase the generalisability of previous research [Standing, Guilfoyle, Lin,and Love (2007)]. All five operational risk variables of SMEs of the current study provided evidence to support the notion that there was a relationship between ICT ORM and SME performance.

The empirical evidence presented indicated that a significant proportion of the aforementioned variables impacted on the performance of SMEs. Therefore, the premise of the model in the current study is that there is a strategic impact in terms of ICT operation and SME performance. The evidence was supportive of the strategic recognition or development by respondents of the wider implications of ICT operation.

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Policy Options for Financing Urban Transportation in Resource Constrained Environments: The Case of Lahore, Pakistan

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In all prosperous and modern economies, cities are the engines of growth and melting pots of diversely talented individuals. They offer inclusive environments with openness and access to opportunities, enabled by efficient and affordable transport systems leading to economically productive interaction between citizens. On the other hand, many cities in rapidly urbanising developing countries have not been able to develop efficient spatial structures, which results in traffic congestion and poor transport services. Their resource-constrained governments often struggle to fill gaps in transport infrastructure demand, which in the case of megacities requires mass transit projects. In the case of Lahore, Pakistan, however, the Provincial and Federal governments appear deeply committed to undertaking mass transit services despite chronic fiscal and financial constraints. The paper first explores Lahore's urban form and function from the transportation and land-use perspectives, presenting an in-depth sub-city level analysis of spatial variations in key characteristics. Second, by undertaking a review of transport infrastructure financing literature it evaluates the viability of three main policy options in Lahore, including public private partnerships, municipal finance options and reforming urban land-use zoning. It concludes that governments in such environments could benefit from land-financing by utilising centrally located State-owned lands through market oriented land-use regulation reforms.

1. INTRODUCTION

In line with trends in developing countries experienced worldwide, Pakistan is undergoing a dramatic transition towards higher levels of urbanisation. According to the United Nations Population Fund (2007) the share of the urban population in the country went up from 17.4 percent in 1951 to 32.5 percent in 1998 and currently stands at over 40 percent. This trend is projected to accelerate in the years ahead, with estimates for 2025 going as high as 60 percent urbanisation. In addition, Karachi and Lahore have emerged as megacities with populations officially estimated at 11 million and 8 million respectively [Planning Commission of Pakistan (2011)]. With the exception of high-end suburban residential establishments, this growth has been largely spontaneous, resulting in severe disparities in housing provision, with the 68 percent lowest income segment affording only 1 percent of total housing units

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in the country [Siddiqui (2014)]. Many newly arriving migrants reside in informal settlements usually located at the peripheries of the city with no land tenure security and poor urban services. The urban form and function is being dictated by seemingly random forces, hence the expansion patterns of cities like Karachi and Lahore have become largely haphazard.

As a result, Pakistan's largest cities are plagued with severe public service delivery shortages ranging from sanitation to healthcare to solid waste disposal to street lighting. The rapidly sprawling urban spatial structures, spurred by mushrooming residential complexes and peripheral slums, have also worsened the performance of transport systems [Haider (2014)]. Not only are Pakistan's cities largely car-dependent, but the existence of urban poverty means that the status quo becomes unfair towards those who cannot afford private vehicle ownership [Alam (2011); Imran (2010)]. Moreover, the status quo discriminates against women, whose utilisation of public transportation remains low [Oriental Consultants (2011)]. While it is sometimes argued that access to affordable and safe mobility is a basic human right, there is little doubt that it has great implications for economic and social outputs within urban environments [Venter, *et al.* (2003)]. The government of Pakistan estimates that in 2005 inadequate road infrastructure costs $2 billion to the economy, or around 0.7 percent of GDP [Saleem (2008)]. Yet even in the Federal Budget 2011-2012, only $500 million were allocated for transportation investments, mainly due to spending constraints [*Economic Survey of Pakistan* (2012)]. Given these fiscal realities, the gap between capital investment requirements for urban transport infrastructure and economic growth generating levels continues to rise. Given that the new PML-N led federal and provincial governments prioritise urban transportation projects [Planning Commission of Pakistan (2011)] the challenge of filling this gap has exacerbated substantially.

As part of a wide-ranging reform agenda report titled "Framework for Economic Growth" the Planning Commission of Pakistan[1] had identified poor urban connectivity as a major reason for persistently low economic growth in the country [Planning Commission of Pakistan (2011)]. Instead of smart growth and mixed land-use (leading to greater population density) which are conducive to human creativity led innovation, Pakistan's cities are rapidly sprawling through gated suburban communities such as Bahria Towns, DHAs etc. This pattern of urban development is increasing demand for affordable urban mobility, meeting which is essential for sustainable economic growth [Lucas and Rossi-Hansberg (2002)]. The lack of world-class urban connectivity in cities is directly hampering economic growth in Pakistan; hence connectivity has rightfully become a central pillar of the new government's economic growth strategy.

Given the policy oriented nature of this topic, this paper addresses the following research questions. What is the extent of spatial disparities in key measures of societal well-being within the Lahore metropolitan region? How does it impact the city's urban form and access to economic opportunity for its

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[1]The Planning Commission of Pakistan holds the status of a federal ministry and is considered the foremost economic planning and analysis arm of the government responsible for long-term strategic planning to provide basis for policy-making at the federal level.

citizenry? In addition, what are the underlying reasons responsible for poor physical connectivity in the Lahore metropolitan region? How can low-income countries finance expensive but necessary investments in urban transport infrastructure through financial and policy instruments? In developing responses to these questions, the paper utilises theoretical insights on the relationship between urban transportation and economic performance while extensively documenting spatial disparities within the metropolitan region.

Moreover, this paper is the first known attempt to situate data on Lahore's urban form and function within the context of urban economic theory. Specifically, it documents the spatial heterogeneity in socioeconomic and transport related indicators before finding that the inability to reverse sprawl and manage traffic congestion emanates from the lack of financial resources for providing the necessary transport infrastructure. It further argues that the existence of disparities in indicators of human well-being is partly explained by urban land-use regulations. Moreover, in line with several other cities around the world, the underperforming governance system has stifled urban development and cast disproportionate effects on the socioeconomic indicators of the region's 15 constituent towns and *tehsils*.

Following this introduction, Section 2 presents a detailed overview of Lahore's urban form and function, which elaborates on the path dependencies of its growth pattern, spatial heterogeneity in spatial structures and its transportation system. Section 3 presents both explanations of theoretical frameworks and their practical evaluation on Lahore of three primary policy options for financing urban transportation. Finally, Section 4 offers concluding thoughts that summarise the paper's key findings and outline a future research agenda as the government continues moving forward on additional mass transit projects in the city and elsewhere.

2. THE LAHORE METROPOLITAN REGION

Lahore is a fast-growing metropolis with tremendous heterogeneity across its 15 towns and *tehsils,* and over 200 Union Councils in key urban development parameters including population density, public service delivery, income distribution, vehicle ownership, and educational attainment etc. The major challenges facing Lahore—income-based segregation, housing shortages and service delivery—mirror typical issues accompanying rapid urbanisation throughout Pakistan [Qadeer (2006)]. Hence this in-depth case study of Lahore provides insights (albeit non-representative) into the overall policy challenges and economic opportunities emanating from urbanisation in Pakistan. The long-term economic performance of the country heavily depends on the efficiency of cities [Haque (2014)] which is in turn relies on efficient and affordable urban mobility services. Before evaluating policy options, however, highlighting key socio-economic dimensions of the Lahore metropolitan region[2] situates theoretical perspectives into appropriate policy lenses. The remainder

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[2]Lahore Metropolitan Region is defined as representing the Districts of Lahore, Kasur, and Sheikhupura due to functional integration, as acknowledged by the Lahore Urban Transport Master Plan of 2011.

of Section 2 examines the spatial urban structure of the metropolitan region by focusing on spatial disparities, their impact on the movement of people and their economic productivity.

2.1. Path-Dependent Growth Patterns

Situated on the east bank of river Ravi, the city was the seat of power for the Mughal Empire that ruled the Indian subcontinent between the 15th and 17th centuries. Until the middle of the 17th century, the vast majority of Lahore's residents resided inside the walled city, as were major commercial activities. During the British colonial period however, between the mid-18th century and the creation of Pakistan in 1947, the city saw rapid expansion outside the walled city. The British constructed a town centre, a cantonment and several arterial roads along the way, thus establishing the foundations for modern urban development. At the time of the partition of the Indian subcontinent in 1947, Lahore became a major destination for tens of thousands of families migrating from current-day India [Mazhar and Jamal (2009)]. Almost overnight, the city's entire Hindu population was replaced by migrants with few or no belongings. Given that the fleeing population controlled most of the economy via trading and wholesaling operations, the economic structure of the city was changed completely [Hill, *et al*. (2004)].

Today, the city and its peripheries host the largest trading and industrial base of the Punjab province and serves as its capital. The population growth since the late 1940s has been phenomenal, growing from just 0.8 million in 1951 to over 8 million today. If the historical annual population growth rate of 3.3 percent continues, the city is projected to cross the 12 million mark before 2025, making it one of the largest megacities of the world [Mazhar and Jamal (2009)]. Understandably, this remarkable growth has brought several problems such as severe traffic congestion, poor public service delivery, urban slums and environmental degradation. The key dimensions of Lahore's spatial structure, both from a socio-economic and transportation perspective, are now discussed to better inform the policy options discussed in Section 3.

2.2. Spatial Heterogeneities in Socio-economic Indicators

Like most other dynamic and fast growing cities, Lahore region's spatial transformation has resulted in spatial heterogeneity across its 15 towns and *tehsils*[3] on indicators such as population density, public service delivery outcomes, access to transportation, and income levels. All statistics are based on the author's calculations using the Lahore Urban Transport Master Plan (LUTMP) 2011 data set, produced through extensive field work by the Tokyo-based Oriental Consultants (2011).[4]

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[3]As shown in Table 1, the Master Plan defines the Lahore Metropolitan Region as constituting the Districts of Lahore (10 Towns), Kasur (2 Tehsils) and Sheikhupura (3 Tehsils), mainly due to their functional integration with Lahore proper.

[4]Lahore's 10 constituent administrative areas are termed Towns, which are equivalent to Tehsils within the Districts of Sheikhupura and Kasur. Hence the terms Towns and Tehsils are used interchangeably in the context of the Lahore Metropolitan Region.

Table 1

Socio-economic Profile, by Towns/Tehsils (Oriental Consultants 2011)[5]

Town/Tehsil	Population Est. 2011 ('000s)	Average Income (Rs/mo)	Unemployment	Low Income[6]	High Income	Graduate Education
Lahore	**7,119**	**23,684**	**15.6%**	**21.1%**	**23.6%**	**4.6%**
Ravi	1,007	20,827	13.8%	20.0%	18.0%	2.5%
Data Gunj Bakhsh	970	24,083	16.0%	14.0%	25.0%	3.8%
Samanabad	984	26,724	16.7%	11.0%	34.0%	5.1%
Shalamar	854	22,330	13.9%	18.0%	22.0%	2.5%
Gulberg	778	29,484	13.3%	25.0%	19.0%	6.1%
Aziz Bhatti	609	20,697	14.6%	25.0%	19.0%	4.0%
Wagah	263	17,216	18.2%	33.0%	12.0%	1.8%
Nishter	399	17,820	17.5%	31.0%	13.0%	2.1%
Iqbal	424	23,964	17.8%	22.0%	30.0%	5.3%
Cantonment	831	33,690	14.1%	12.0%	44.0%	12.7%
Sheikhupura	**331**	**17,870**	**19.7%**	**36.3%**	**13.3%**	**2.0%**
Ferozwala	152	16,297	21.6%	40.0%	10.0%	1.6%
Muridke	143	16,401	20.7%	41.0%	10.0%	1.0%
Sharaqpur	36	20,913	16.7%	28.0%	20.0%	3.4%
Kasur	**121**	**18,990**	**20.1%**	**42.5%**	**18.5%**	**3.7%**
Kasur	50	22,523	19.0%	38.0%	27.0%	6.7%
Pattoki	71	15,457	21.1%	47.0%	10.0%	0.8%
Region	**7,571**	**20,181**	**18.5%**	**27.0%**	**20.9%**	**3.4%**

The wide range of monthly household incomes,[7] from the lowest Rs 17,216 in Wagah to Rs 33,690 in the Cantonment, is indicative of substantial income disparity and spatial segregation by economic class. The most prosperous towns, the likes of Cantonment and Gulberg, are primarily residential (albeit some commercial centres such as Liberty or Cavalry) and were developed relatively recently. This clearly demonstrates that the primarily car-dependent and restrictively zoned parts of the city host the highest income households. On the other hand, the historical central towns of Ravi, Data Gunj Bakhsh and Shalamar have disproportionately large middle-income populations and relatively low average income levels.

In addition, *tehsils* outside of Lahore, i.e. Ferozwala, Muridke and Pattoki, report over 40 percent of their households earning more than Rs 40,000 per month (classified as high income) as compared to the regional average of 27 percent. Paradoxically, despite boasting income levels 67 percent higher than the regional average, only 12.1 percent of households in Lahore's Cantonment town are high income earners. This indicates high levels of spatial heterogeneity in income distribution, with the region's top 1-2 percent earners confined in the primarily residential enclaves of Defence Housing Authority, Cavalry Ground, Sarwar Road etc. In each of these localities however, low-income

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[5]Note that all reported statistics, including average income levels, are reported by place of residence as opposed to place of work.

[6]Low income households are defined as those earning less than a total of Rs 10,000 per month, with high income earning more than Rs 40,000 per month.

[7]Lahore's overall average income of Rs 20,181 is not weighted, and treats each Town/Tehsil equally.

households remain embedded (overall 12 percent in Cantonment are low-income) as homemakers and residential service providers.

Likewise, the highest unemployment levels unsurprisingly are reported outside of Lahore District, prominently including Ferozwala, Muridke and Pattoki. Within Lahore District, unemployment in the towns of Gulberg, Shalamar and Ravi are on average five percentage points better than the regional average. Similarly, Lahore District's average unemployment rate of 15.6 percent, albeit high in absolute terms, is significantly lower than 19.7 percent and 20.1 percent in neighbouring Sheikhupura and Kasur Districts respectively. Both of these facts confirm the existence of agglomeration effects despite poor inter-District connectivity. In other words, *citrus paribus*, households located in Lahore District have better access to economic opportunities and therefore enjoy higher income levels [Krugman (1991)]. The urban economic theory posits that strengthening inter-city connectivity helps establish an efficient system of satellite cities around large agglomeration, which results in spatial sorting of economic sectors [Henderson, *et al.* (2012)]. From a policy standpoint therefore, public investment in improving regional connectivity would likely boost productivity throughout the Lahore region.

Education has been found to be a crucial driver of economic growth in cities [Glaeser (2011)], yet only 3.4 percent of Lahore's sampled population reported having graduate degrees (Masters or above). In line with trends of spatial variation, the towns have a broad range on this indicator, from as low as 0.8 percent in Pattoki to 12.7 percent in Cantonment. Not surprisingly, the data shows a strong correlation between educational attainment and household income levels, with the notable exception of Iqbal Town and Kasur Tehsil which have average income levels despite high educational attainment. This likely implies the lack of job opportunities in both areas, accompanied by the existence of several major educational institutions in Iqbal Town. Overall, the town and *tehsil* level analysis presented in this subsection reveals the existence of major spatial variations in key socio-economic and developmental indicators. Since Lahore's form and function is highly intertwined with its transport system, Section 2.3 therefore discusses key patterns of population density, car ownership and flow of workers within the region.

2.3. Land-Use and Urban Mobility

In Lahore, 40 percent of all urban trips are non-motorised and only 16 percent of households are car owners [Haider (2014)]. However, during the decade of the 2000s, the majority of transport allocations were made for urban roads and bridges, including several underpasses along Canal Road and the Lahore Ring Road Project. In the 2013-14 budgetary allocation, the Government of Punjab has allocated over 58 percent of the infrastructure development spending programme on roads alone.[8] Till the budget year 2010-11, no substantial investments were made in mass transit systems despite the overwhelming demand for public transport. In the fall of 2012 however, a Bus Rapid Transit system was introduced which today attracts over 140,000 daily trips and appears to have eased congestion along Ferozpur Road.[9] The data presented in this paper was collected in the Spring of 2011 and therefore does not incorporate the impact of that project.

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[8]Government of the Punjab's budgets are available at: http://punjab.gop.pk
[9]Statistic was reported by the Punjab Metro Bus Authority during a presentation at the 2nd South Asia Cities Conference, held in Karachi in January 2014.
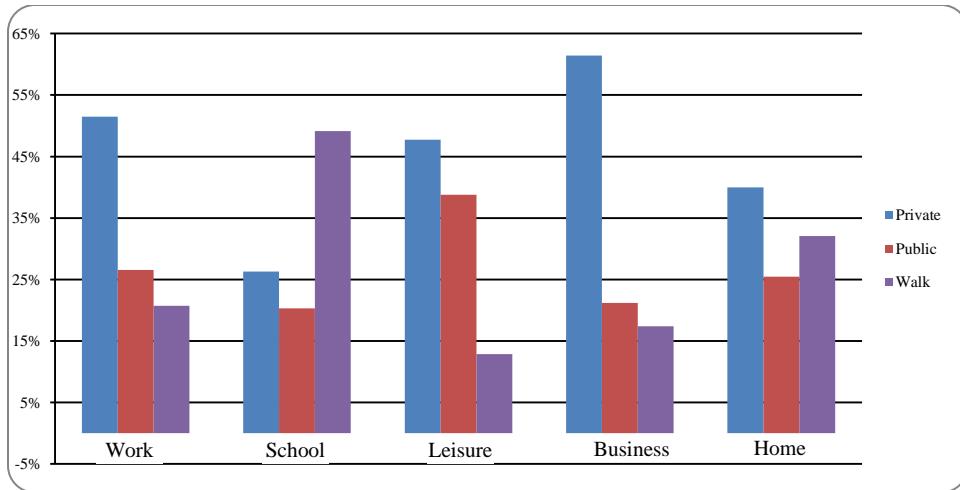
Fig. 1.Trip Distribution by Mode of Transport (2011).

The Lahore region's overall trip distribution, presented in Figure 1, shows most work and business trips are undertaken on privately owned vehicles whereas almost half of all school-bound trips are on foot. This shows that both the city's job creating and income generating classes, most of which are based outside of the inner-city towns mentioned earlier, are benefiting the most from recent investments in road infrastructure improvements. In four out of five categories, private vehicle trips (includes driving and riding) form the highest proportion of trips, closely followed by public transport and walking. The fact that only 12 percent of leisure trips are walking indicates a considerable lack of accessible public spaces, which disproportionately affects marginalised groups including women and the elderly.

Table 2

Population Density, Car Ownership and Worker Flow (by Town/Tehsil 2011)

Town/Tehsil	Density (Pop/ha)	Cars per 1,000 People	Day Time Worker Flow (%)
Lahore	**48**	**56.0**	**163.6%**
Ravi	328	14.1	15.6%
Data Gunj Bakhsh	317	36.3	76.3%
Samanabad	262	44.3	18.1%
Shalamar	350	22.5	−34.7%
Gulberg	178	70.5	100.8%
Aziz Bhatti	97	35.2	−39.3%
Wagah	15	28.1	−17.8%
Nishter	19	39.7	−22.5%
Iqbal	18	143.8	52.7%
Cantonment	85	125.9	14.4%
Sheikhupura	**10**	**67.1**	**−49.8%**
Ferozwala	9	58.9	−21.9%
Muridke	12	24.2	−9.7%
Sharaqpur	7	118.3	−18.1%
Kasur	**12**	**153.4**	**−38.6%**
Kasur	11	284.5	−26.1%
Pattoki	13	22.4	−12.6%
Region	**33**	**92.2**	**75.2%**

In line with patterns of spatial variations discussed earlier, there is significant variation in rates of car ownership and population density across towns. As shown in Table 2, the car ownership rate (per 1,000 persons) varies from a meagre 14.1 in the densely populated Ravi Town to over 143 in the car-dependent and largely residential Iqbal Town. As expected, there is a strong negative correlation between population density and car ownership rates, further confirming that outer city towns such as Cantonment and Iqbal remain highly car-dependent. In the absence of affordable and convenient public transport, this significantly reduces access to economic opportunities for individuals without access to privately owned vehicles. For example, any low-income individuals residing in RA Bazar area of Cantonment Town and attempting to access industrial jobs along Raiwind or Ferozpur Roads (Lahore-Kasur section) would stand at a significant disadvantage in terms of labour market access.

The inner-city towns of Ravi, Data Gunj Bakhsh and Shalamar, located west of river Ravi are the most densely populated areas, within which the old walled city remains the trading and wholesaling district [Glover (2007)]. The variation in density is illustrated by the fact that Ravi's density alone is more than 21 times that of Wagah and nearly 10 times the overall regional average. While theories of urban economic growth and innovation (developed largely in the West) view population density positively, the correlation between high density and low-income (with low levels of educational attainment) in Lahore's towns shows that this is merely congestion without any low likelihood of positive impacts on human creativity [Glaeser (2011); Florida (2002)].

In line with other major South Asian cities, Lahore is devoid of any identifiable Central Business District (CBD), and presents a polycentric urban landscape with spatially dispersed job centres [Haque (2014)]. By measuring the differences between day and night time populations, the third column in Table 2 estimates the movement of workers (all employed individuals) with positive values indicating net inflows. As expected, the districts of Sheikhupura and Kasur are net suppliers of workers to jobs based in Lahore District's job centres, led by Gulberg, Data Gunj Bakhsh and Iqbal. The fact that Gulberg's worker population doubles during the day indicates that it's the closest to being Lahore's CBD. Moreover, Lahore District's overall worker inflow of 163.6 percent shows that despite chronic transportation problems, Lahore's workforce is highly mobile albeit in an inefficient manner. Despite the lack of origin-destination matrices, it is safe to assume that workers based in the towns of Aziz Bhatti, Nishter and Shalamar move in and out of job centres located several kilometres away, hence any public investments in improving the affordability and/or convenience of mobility would boost worker productivity [Moretti (2014)]. The following subsection therefore articulates Lahore's current policy response to the challenges posed by this urban form.

Having outlined the urban form and function *vis-à-vis* its impact on the transport requirements of this bourgeoning metropolitan region, the following section evaluated three option response options. By reviewing their theoretical foundations, the paper explores whether they are likely to resolve the city's chronic need for urban transportation infrastructure, preferably through mass transit systems.

3. THE OPTIONS FOR FINANCING TRANSPORTATION INFRASTRUCTURE

As discussed in Section 2, traditional policy responses to Lahore's transportation challenges have centred around investments in road based infrastructure, which in turn are based on the belief that wider roads and improved traffic management will alleviate traffic congestion. However, urban transportation literature confirms that vehicle miles travelled tend to increase one-to-one with provision of additional roads [Duranton and Turner (2009)]. Hence the policy response to building additional road lanes, flyovers and underpasses can at best provide short-term relief without addressing the underlying and long-term issues. Despite the clear need for reforms and fresh thinking, urban transportation planning appears to have reached an imaginative dead-end. Irrespective of whether or not mass transit is economically viable in Lahore, there exists an overwhelming need for additional transportation infrastructure throughout the city and its sprawling suburbs [Planning Commission (2011)]. Whether that infrastructure is in support of road-based transportation or for mass transit remains to be decided.

While there are several options for responding to Lahore's transportation infrastructure challenge, this paper will introduce fresh ideas on improving the situation followed by a discussion of the potential bottlenecks in implementation. Given the recent focus of the Punjab government on mass transit projects, policy-makers will be offered an analytical perspective on viable and sustainable policy options for financing expensive infrastructure projects across Pakistan's major cities. In the following subsections, we evaluate the policy options of Public-Private Partnerships, creative municipal financing mechanisms and finally, introducing mixed land-use in areas where it remains absent.

3.1. Can Public-Private Partnerships Work in Lahore?

In the past fifteen years, public-private partnerships (PPPs) have generated immense interest amongst developing countries' governments who see them as means of cost cutting and efficient allocation of public resources [Estache, *et al*. (2007); Brown (2007)]. PPPs are a special form of public procurement which "bundles investment and service provision in a single long term contract" whereas the "concessionaire manages and controls the assets, usually in exchange for user fees and government transfers, which compensate for investments and other costs" [Engel, *et al*. (2011)]. They further argue that PPPs are closer to privatisation of infrastructure and optimal risk allocation can lead to short-term welfare gains which are much needed in countries with bourgeoning levels of public debt.

Not surprisingly therefore, PPPs are being promoted by the Punjab provincial government as the most viable alternative to the unsuccessful traditional approaches to building infrastructure [Government of Punjab (2010); Planning Commission (2011)]. They are seen as the most viable response to Lahore's chronic transportation infrastructure shortages. These assertions, however, are not without merit. After reviewing many years of projects implemented by the World Bank for example, Gwilliam (2002) concludes that the private sector often commands much-needed resources that developing country governments simply cannot provide. However, Prud'homme (2004) argues that the long-term and lumpy nature of infrastructure makes it impossible for the public sector to remain on the sidelines. In many cases therefore,

governments end up encouraging private investment, but only after providing guarantees that most project risks will be borne by them.

However, the real challenge is to ensure seamless implementation of projects through coordination between the public and private sectors. Often the interests of the two parties diverge, thus creating disincentives for them to work harmoniously in the pursuit of mutually acceptable objectives. Urban transport is especially problematic due to complications arising from land ownership disputes, land grabbing mafias, windfall gains and the general lack of legal mechanisms in developing countries to deal with these challenges. In many developing countries, land tenure remains insecure, which delays progress on infrastructure projects [Gwilliam (2002)]. Even when these constraints are not binding, government's procurement laws and processes happen to be archaic while the "project-to-project approval culture at the highest government level is inefficient" and leads to disempowerment of the public bodies responsible for implementation in the Pakistani context [Planning Commission (2007)].

The basic purpose of implementing PPPs is to utilise private sector capital and technical expertise in the provision of infrastructure. In Pakistan, however, harnessing private sector potential for the benefit of the general public remains a challenge due to socio-economic and political reasons discussed in detail later. Several World Bank reports look at PPPs as another procurement option, but government in most cases outsources the job of building infrastructure. [Bojovic (2006)]. It is assumed therefore that the private sector has the capacity, resources, technical capacity and willingness to invest heavily in transport projects [Gwilliam (2002); Harris (2000)]. However, it must be kept in mind that private parties are mostly interested in profits and thus it becomes the government's responsibility to ensure that their involvement remains profitable. Without profits, future projects are unlikely to generate traction in the private sector, thus endangering the very concept of PPPs [Linder (1999)].

Private construction and infrastructure companies in Pakistan can seldom boast of capital flows and technical knowledge necessary to undertake international quality projects. It is not surprising therefore, that all pre-feasibility studies of the proposed Lahore mass transit project were undertaken by foreign companies [Oriental Consultants (2011)]. While international contractors bring world-class expertise, their involvement translates into a host of complications such as risks associated with currency conversions, international political economy issues and highly complicated bidding processes etc. The lack of indigenous private sector capacity poses a severe challenge to the establishment of PPPs as a viable financing mechanism in the context of Pakistan.

3.2. Does Municipal Finance Offer any Viable Solutions?

Apart from the option of partnering directly with private sector firms, local and municipal governments can usually utilise localised financing mechanisms such as municipal bonds to fund infrastructure projects [ADB (2009); Vaidya and Johnson (2001)]. Without going into the details of financial instruments available, this section will focus on key factors preventing Lahore's city government from proactively pursuing these options despite the overwhelming need for funding.

The first problem lies in the realm of underdeveloped markets. In this case, countries do not have any financial market mechanisms to attract institutional or even

individual investors towards buying municipal or project related bonds tied with specific infrastructure initiatives [Rastogi and Rao (2011)]. While many countries have utilised this facility including neighbouring India, Pakistan's financial markets are poorly organised and are marred by poor regulation and frequent market failures featuring stock market crashes [Ellahi (2011)]. The savings rate of the country is amongst the lowest in the region, whereas the unbanked population of the country offers tremendous commercial banking opportunities [Khan, *et al.* (1994)]. Yet the central bank has made effort to incentivise commercial banks to reach out into the country's rural heartland where it is still customary to save money in stacks of cash under beds and in hidden closets. Given the great amount of assets to back securities and the sovereign guarantees of national governments, it is not difficult to raise capital through municipal bonds which can then be used to develop expensive infrastructure [Bailey, *et al.* (2009)].

But in order for this to happen, Pakistan's financial sector must be allowed to develop other fixed income financial assets that are traditionally not the hallmark of the Karachi-based financial market of the country. Over-regulation of the financial industry, mainly due to slow-moving government bureaucracy and lack of political will, has severely hampered economic growth in Pakistan [State Bank (2005)]. In order to break this low-credit-low-growth cycle, the burgeoning regulations on the financial industry need to be slashed, allowing indigenous financial institutions to innovate for expanding their product lines [Husain (2004)].

Yet even if these reforms are introduced and local governments become motivated to raise finances, there are other challenges in the governance system that will create bottlenecks. The budget of an average Pakistani local government relies up to 80 percent upon fiscal transfers from provincial or federal level, thus in real terms they only have about 20 percent control over the total resources that they command[Gupta and Rayadurgam (2008)]. This leads to the so-called dependency syndrome which eventually incapacitates local and municipal governments to generate revenues from indigenous resources. Remaining consistently dependent on fiscal transfers not only erodes the autonomy of local governments, but also creates disincentives for forward-looking agencies to develop innovative financing tools [Cheema, *et al.* (2005)]. In order for local-level infrastructure financing to become a reality in Pakistan therefore, local governments must be granted greater fiscal autonomy. Rastogi and Rao (2011) argue that financial risks are over-priced in developing countries and thus higher levels of government involvement (both federal and local) will be necessary to maintain the balance between supply and demand of financing. It follows that the true potential of PPPs cannot be realised without fiscal, regulatory and operational reforms that would facilitate debt market development.

Reforms are not that simple though. There are deep-rooted political and social interest groups who maintain a vested interest in maintaining the status quo [Raza (2011)]. Pakistan's economy today is marred by organised rent-seeking groups that are strongly connected to the ruling élites. Every time reforms are introduced, attempts are made by these parties to delay or sabotage genuine devolution of power to the grassroot level [Lieven (2012); Zaidi (2011)].[10] Therefore, more viable policy alternatives need to be explored which can be implemented through political will, and which ultimately will lead to genuine policy reform.

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[10]A detailed discussion on this topic is beyond the scope of this paper, however it will be dealt with in greater detail in future research.

3.3. Can Altering Land-Use Zoning Solve the Problem?

A new wave of development thinking has been inspired by Romer's (1990) seminal work, arguing that human ingenuity lies at the heart of economic development. It follows that capital investments by government in hard infrastructure merely provide the support structures that facilitate the core processes of creativity. Florida (2002) coined the term "creative class" to refer to the hi-tech professionals, artisans, and musicians whose presence in urban metropolises fosters an open and dynamic environment that attracts investments that lead to innovation. Dividing cities into residential and commercial zones hampers creativity and innovative capacity of its residents, both of which are essential for long-term economic progress in the 21st century economic environment [Landry (2008); Glaeser (2011)]. As early as in the 1960s, seminal works from urban theorists were arguing that cities are essentially people-systems and urban policy should foster human interactions instead of constructing urban highways to ensure free flow of vehicles [Jacobs (1961)].

However, policy-makers in Pakistan appear to largely ignore these insights by still planning cities as enclaves of residential, commercial and recreational areas. This prevents the creation of dynamic urban environments, including clustering of industries, that can foster creative interactions leading to economic growth [Trip and Romein (2012); Yigitcanlar (2012)]. Unlike the world's most creative urban centres such as San Francisco and London, Pakistan's cities only allow three urban zones: residential, commercial and recreational. In the case of Lahore for instance, while inner-city towns such as Ravi and Data Gunj Bakhsh are *defacto* mixed land-use areas due to lax enforcement, the *dejure* urban zoning laws are highly restrictive.

From an urban planning perspective, revamping the zoning system remains a powerful instrument for governments to intervene in market operations, eventually curbing land market distortions. Gomez-Ibanez (2006) argues that by resorting to land-grabbing and other forms of rent-seeking, small groups of influential incumbents enjoy windfall gains at the cost of the majority. This is particularly true in Lahore as its wealthy elite are enjoying highly subsidised downtown facilities on expensive State-owned land. Haider (2006) argues that this is part of a "systematic bias" against low-income households in Pakistan which remain the periphery for the influential urban core. The existence of government-owned and exclusive recreational facilities in downtown Lahore creates land market distortions which can only be reversed through rezoning reforms.

Most interestingly, while Gomez-Ibanez (2006) argues that since government is the least likely stakeholder to get captured hence it must always have a legitimate role in infrastructure outcomes; in Lahore there are elements within the state apparatus that are capturing the land market. According to the World Bank (1994), infrastructure provision should be aimed at "sharing of the benefits of growth to reduce poverty" and must be built around the "connecting role of infrastructure". If these objectives are to be met, then Lahore must make room for relaxing its archaic and unrealistic urban zoning system.

This goal can be achieved by relaxing land-use zoning, as illustrated in the following example. In the area around Mall Road's Panorama Centre in Lahore, the market value of commercial land stands at approximately $159 per square foot (Source: www.Zameen.com). Within a mile from this commercial area, there are large swaths of State-owned lands including the Governor's 100-acre mansion, the Aitchison College,

Government College University, the Lahore Zoo, the Jinnah Gardens, Punjab provincial Assembly building, government officers residences, Al-Hamra arts council and two golf courses located within the exclusive Punjab and Lahore Gymkhana clubs. As shown in Appendix A, the ballpark market value of the Governor House alone stands at $694 million (assuming no second-order impacts), enough to build 11 miles of over-the-ground metro rail line along the same corridor.[11] While some establishments mentioned above include public spaces and educational institutions that deserve to remain centrally located, others including the Governor's mansion, elite golf and horse racing courses and expansive housing for bureaucrats need not be situated in the area. The government of Punjab has the administrative capacity to move these facilities to other parts of the city without any obstacle. Given the size of Pakistan's entire economy to be $480 billion,[12] these potential investment gains are large enough to boost the annual GDP growth rate by 0.16 percent on their own without considering the potential second and third order effects.

Through a well-planned and carefully implemented commercialisation and land-financing programme, expensive State-owned land can be utilised for stimulating much needed investment in the country.[13] In order to avoid the malaise of endemic corruption, each commercialisation endeavour should be explicitly tied to well-specified projects as a form of public accountability. For example, if the Governor house's size is to be reduced to 10 acres, the remaining 90 acres could directly fund mass transit in the same vicinity. While this would require unprecedented and broad-based political willingness, introducing land-use zoning reforms are relatively straightforward. The highly expensive and sought-after residential neighbourhoods should be zoned as mixed land-use areas, thus allowing the opening of commercial establishments such as restaurants and retail outlets. Not only will home-owners and the government enjoy capital gains and revenues respectively, but these areas would potentially turn into dynamics hubs of interaction between citizens belonging to all strata of society. Moreover, such initiatives would usher a more inclusive urban environment, which in turn could improve economic outcomes [Landry (2008)].

4. CONCLUSION

This paper has highlighted some of the fundamental challenges facing urban transport planning in Lahore (as representative of other developing country cities) while exploring its urban form and function. In addition, by surveying selected academic literature on municipal finance, PPPs and urban development, an attempt was made to apply theoretical knowledge through viable policy option evaluations. By discussing PPPs, municipal finance and urban zoning the author has attempted to highlight their inter-linkages through a societal lens. In all three areas, poor governance and institutional incapacity exacerbate the situation whereas socio-economic elites maintain a vested interest in maintaining the status quo that protects their essential interests. As indicated

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[11]This estimate is made based on New Delhi metro's phase I completing financing details, according to which the average per mile cost of building overhead metro stands at over $40 million.

[12]Based on Purchasing Power Parity (PPP).

[13]From their peak of 22.5 percent of GDP in 2007, investment levels in Pakistan have fallen steeply to their current level of only 12.5 percent of GDP. This is the lowest level in six decades!

by the survey of literature and practitioner reports, Lahore is not alone in facing these challenges, most of which are common across the developing world.

Moreover, by situating urban policy challenges into a solution-oriented framework, this paper offers a platform for further research on Pakistan's urban and economic development challenges such as congestion, sprawl, poor service delivery etc. Beyond the political economy of urban development, the problems of rent-seeking and the over-involvement of the State in the economy are larger issues that plague every aspect of economic development in countries like Pakistan.

APPENDIX A

ESTIMATING THE VALUE OF STATE-OWNED LAND

The following outlines the rough estimation of the market value of State-owned land along the Mall Road in the heart of Lahore. It must be stated that this is a simplistic method based on linear extrapolation of commercial land values, assuming that the commercial land value along the Mall Road can be applied to much larger swaths of land such as the 100 acre Governor's house. In the real-estate market, however, there are several unknown factors that determine the land value, thus these estimates are merely guesstimates.

These are the steps followed for the simple arithmetic calculation:

- Price of commercial land on the Mall Road: $159 per square foot.[14]
- Size of Governor House Lahore: 100 acres[15] = 4.36 million square feet.
- Commercial worth of Governor's House: $694 million.
- Size of Pakistan's Economy: $488 billion (at Purchasing Power Parity).
- Governor's House worth as percentage of economy: 0.14 percent.

Apart from the Governor's House, there are large swaths of land occupied as government officers' residences, Lahore Gymkhana and Aitchison College, none of which are being included in the calculation.

Following are the steps for calculating the length of mass transit that can be constructed from around $700 million. Being the closest city with a mass transit system, New Delhi was used as a benchmark for costs of construction.

- Cost of Delhi Metro phase 1: $2.6 billion for 65 kilometres length.
- Cost per kilometre: $40 million; Cost per mile: $64 million.
- Total miles of mass transit for Lahore Governor House: 10.9 miles.

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[14]Average price in Panorama Centre and Hall Road commercial areas, only 500 feet away from the western wall of the Governor's mansion.

[15]Size was estimated from Google Maps using multiplication of length and width from the scale developed by the map provider.

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Determinants of Littering:
An Experimental Analysis

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Littering, the improper disposal of small quantities of waste, is one of the main causes of environmental degradation. To protect the environment from this degradation, we need to factor out the determinants of littering behaviour. In this study, we conduct a controlled laboratory experiment to examine whether people would avoid littering if the social cost of this behaviour was internalised. Based on the microeconomic theory relating to externality, we test whether penalising littering decreases its level compared to when it is not.. The results indicate that when the cost of production of littering is internalised, the level of littering drops.

1. INTRODUCTION

The careless and improper disposal of small quantities of waste is defined as littering [Geller, *et al.* (1982); Stokols and Altman (1987); Keenan (1996)]. Keep America Beautiful (2009) shows that improper litter disposal poses a threat not only to human, animal, and plant life, but also to man's economic prosperity. Raffoul, *et al.* (2006) show that along with polluting surface and ground water, littering is one of the main causes of transmission of diseases like dengue and leptospirosis. Additionally, littering makes the environment unpleasant, causes vehicle accidents and puts children at risk of cuts and infections in public places like parks and grounds.

Studies show that various factors lead to littering. For example, people litter when they are too lazy to dispose their waste properly [Ojedokun and Balogun (2011)], when they argue that everyone else is doing it [Campbell (2007)] and when there is lack of waste bins nearby [Williams (1997); Keep America Beautiful (2009); Ojedokun and Balogun (2011)]. The findings of other researches also suggest that litter begets litter [Dur and Vollaard (2012)], and that littering persists when the private cost of disposing litter correctly is very high [Torgler, *et al.* (2008)].

Most of the available literature uses field surveys for data collection which makes it difficult if not impossible to isolate the impact of a certain variable of interest without controlling for the other factors. In this study we isolate the impact of the internalisation of the social cost of littering on the level of production of littering by using a controlled laboratory experiment. In a controlled laboratory experiment it is possible for the experimenters to examine the impact of a single factor on littering while controlling for the remaining factors that may influence littering behaviour.

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Our experiment has two treatments: in the Baseline treatment, the participants do not bear the private cost for littering whereas in the second treatment (which we term as the 'Cost treatment'), each participant bears the private cost for littering. Based on the microeconomic theory regarding externality, we hypothesise that an individual will litter more when littering has no private cost as compared to when there is a private cost associated with littering. This private cost may take various forms such as disapproval by others (social cost), remorse and guilt (conscious cost), jail or doing community service (legal cost), or fines etc. (monetary cost).This study examines the impact of monetary cost only. The rationale is that monetary cost is easier to quantify in comparison to the rest of the private costs. Our study finds that the internalisation of the social cost of littering decreases the level of production of littering. On the other hand, littering is more prevalent when individuals do not bear any private cost for the creation of littering.

The rest of the paper is organised as follows: the next section is devoted to literature review; Section 3 explains the theoretical framework and the hypothesis; Section 4 discusses results, and Section 5 draws the conclusion.

2. LITERATURE REVIEW

A volume of studies is available on the issue of littering. Some studies address the question 'why people litter?', some examine the factors affecting the amount and frequency of littering, while some discuss ways to improve littering behaviour for a cleaner environment. A complete review of such literature is beyond the scope of the present study; hence we provide a brief review of studies relevant to our research question in the following paragraphs.

Various researchers have explored the role of laziness in littering behaviour. For example, a study conducted in Nigeria shows that littering is an automatic and routine behaviour as it is easy and comfortable [Ojedokun and Balogun (2011)]. Campbell (2007) concludes that many people litter simply because they do not bother to walk up to a waste basket. Likewise, Williams (1997) states that one of the major reasons of littering is indolence.

Dur and Vollaard (2012) test whether litter begets litter and find that littering increases significantly when regular cleaning is not done. Some other studies show that the presence of litter is an incentive for further littering. [Krauss, *et al.* (1978); Reiter and Samuel (1980); Heberlein (1971); Robinson (1976)]. Other contributing factors to littering are age. Research shows that younger people—especially between the ages of 17 and 19—tend to litter more than older people [Beck (2007)]. Moreover, when the personal cost of disposing waste materials correctly is high in terms of time and energy spent, individuals litter more [Torgler, *et al.* (2008)].

Ojedokun and Balogun (2011) further add that low altruism, low self-efficacy, low locus of control, and low self-concept lead to a positive attitude towards littering whereas higher education and awareness lead to a negative attitude towards littering. Arafat, *et al.* (2007) and Al-Khatib, *et al.* (2009) report that socio-cultural factors such as gender, marital status, monthly income, religious convictions, education level, age, and type of residence all have an impact on littering behaviour. Littering is also more frequent in situations when the person is in a hurry, the item is biodegradable, there is a sense that someone else will pick it up, and when the item is not recyclable [Keep America Beautiful (2009)]. Several studies further state that littering practice is often the result of non-availability of a trash basket nearby [Finnie (1973) and Keep America Beautiful (2009)].

The above analysis shows that extensive research is available on littering. However, to our knowledge, there is no study except of Torgler, *et al*. (2008) which evaluates the impact of internalising the social cost of littering. The focus of Torgler, *et al*. (2008) to an extent, is close to our study; yet, their study is based on European Values Survey, (1999-2000) and is much broader in nature. On the other hand, we focus on a single variable and examine whether internalising the social cost of littering decreases the levels of littering. While the subject matter of our question has been discussed extensively in microeconomic theory, little empirical evidence from a controlled laboratory experiment exists.

3. THEORETICAL FRAMEWORK AND HYPOTHESIS

The study is based on the concept of negative environmental externalities. Environmental externalities refer to the economic concept of "uncompensated environmental effects of production and consumption that affect consumer utility and enterprise cost outside the market mechanism"[Glossary of Environment Statistics (1997)]. When negative externalities are associated withan economic activity, governments usually intervene in the form of bans, taxes, fines, etc. The purpose of these measures is to act as deterrents and to internalise the negative impact of economic activities on a society. Following the basic assumption that all economic agents are rational and wish to maximise their welfare, it makes intrinsic sense that if there is a monetary cost associated with an action such as inappropriate removal of waste, the economic agents will become wary of what they throw on the ground and endeavour to curtail it in order to capitalise on their earnings.

Based on the idea of negative externality discussed above, the present study examines whether the negative externality of littering can be internalised by associating a cost to the act by imposing a fine on the litterers. The hypothesis of the study is thus: littering is likely to be lower if the private cost of its production is high.

3.1. Experimental Procedure

The experiment consists of two treatments, namely the Baseline treatment and the Cost treatment. The participants of the experiment are undergraduate students belonging to the School of Economics, Quaid-i-Azam University, Islamabad.

The participants of the experiments were selected at random by using the ballot system to decide which semester's students would be asked to sit for which treatment. We wrote down the number of semesters on paper chits and put them in a box.[1] This was

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[1]It is pertinent to mention that at the time of the study, three batches were enrolled in the School of Economics (QAU). The first batch students were in their 5th semester while the second and first batch students were in their third and first semester, respectively. Our protocol is between treatments, reason being that we have to collect and count the number of litter pieces produced after students have left the experimental room. Hence, we could not have the within treatment protocol. Additionally, we invited students of different semesters for the two treatments because inviting students of the same semester for both treatments could contaminate the data as students could discuss the experiment with each other during the interval time period. Running both treatments at the same time could solve the issue of running both treatments on the same semester students, however, the constraint of space and number of experimenters did not make that possible.

followed by a blind selection of two chits from the box. Consequently, students of third semester were asked to participate in the Baseline treatment whereas the students of first semester were asked to participate in the Cost treatment (all students were informed beforehand that participation was voluntary). The experiment was conducted in October 2012. The detail of each treatment follows:

3.1.1. *Baseline Treatment*

In the Baseline treatment, there were 40 participants. Each participant was given some coloured sheets with squares drawn on them, 1 pair of scissors and 2 envelopes. One of the envelopes was labelled "Use Me for Squares" and the other was labelled "Use Me for Waste Material". The instructions required participants to cut as many squares drawn on the coloured sheets as possible within three minutes and put those squares into the envelope labeled "Use Me for Squares".[2] There was no monetary cost of littering and the monetary compensation to the participants followed the criterion given below:

Monetary Reward = (PKR 10* Number of completed squares) –
(PKR 0 *Number of pieces of litter)

Participants were informed that 10 percent (4 out of 40) from among them will be randomly chosen using the ballot system (all participants were seated on numbered chairs) and paid PKR 10 for each completed square at the end of the experiment.[3] The experiment lasted half an hour. The randomly chosen participants were paid cash at the end. The earnings of each of these 4 participants were between PKR 40 to 50. The participants were not paid any show-up fee.

3.1.2. *Cost Treatment*

The second treatment was similar to the Baseline treatment: the only difference was that the instructions clearly mentioned that the monetary compensation to the randomly selected individuals would be deducted if extra pieces of paper were found around them (i.e. if they produced litter). As such, a private cost for littering was introduced in this treatment. The rest of the procedure was the same as in the Baseline treatment but with a different group of students. The compensation to the randomly chosen participants was given based on the following criterion:

Monetary Reward = (PKR 10 * Number of completed squares) –
(PKR 5* Number of pieces of litter)

The randomly chosen participants were paid cash at the end of the experiment. The earnings of each of these 4 participants were between PKR 20 to 30.

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[2]See Appendix A for the full instructions used in the Baseline treatment and Cost treatment.

[3]Questions inevitably arise concerning the non-seriousness of participants regarding payoffs in this game. However, the procedures employed (paying off in 1 out of 10 subjects) are comparable to other experimental research in this area. For example, in Kagel, *et al.* (1996) subjects participate in 10 bargaining periods against different opponents in an ultimatum game and they are paid conditional on their bargaining outcomes for one period which is selected randomly at the end of the session.

4. RESULTS AND DISCUSSION

For statistical analysis, we report one-tailed Wilcoxon rank-sum test as the data of our study does not come from a population with a normal distribution. The reason to report one tailed Wilcoxon rank-sum test is that we have ex-ante hypothesis about the impact of cost on littering.

Table 1 shows the descriptive statistics across treatments. The table compares the mean, mode, and standard deviation of the number of completed squares, the number of litter pieces inside the waste envelope, and the number of litter pieces outside the waste envelope across treatments. The mean number of squares cut by each individual in the Baseline and Cost treatments is 4.4 and 4.1, respectively. However, the mode remains the same at 0 in both treatments. On the other hand, the mean number of litter pieces inside the waste envelopes in the Baseline and Cost treatments is 1.0 and 2.18, respectively, while the mean number of litter pieces outside the waste envelope in the Baseline and Cost treatments is 7.25 and 4.75, respectively. In addition, there is a sharp drop in the mode from 9 in the Baseline treatment to 0 (zero) in the Cost treatment. It appears that internalisation of cost does decrease the level of litter outside the waste envelope; however, some participants show careless behaviour towards littering even after incorporating the cost. This is evident from the standard deviation of the level of litter outside the waste envelope in the Cost treatment as compared to the Baseline treatment.

Table 1

Descriptive Statistics Across Treatments

	No. of Completed Squares		Litter Pieces Inside Waste Envelop		Litter Pieces Outside Waste Envelope	
	Baseline Treatment	Cost Treatment	Baseline Treatment	Cost Treatment	Baseline treatment	Cost Treatment
Mean	4.4	4.1	1	2.18	7.25	4.75
Mode	5	4	0	0	9	0
Std. Dev.	1.30	1.88	2.60	3.28	4.38	4.45

Although Table 1 shows a summary of the results across treatments, the detailed behaviour of each participant is unobservable. Therefore, we show the frequency distributions of each of the three decisions made by participants in both treatments.

4.1. Distribution of Completed Squares Across Treatments

Figure 1 presents the distribution of squares across treatments. Taking the number of squares as independent observations, the Wilcoxon rank-sum test shows that the distribution of the number of squares in the Baseline treatment is not significantly different than the distribution of number of squares in Cost treatment ($p=0.16$).This result shows that internalising the social cost of littering does not significantly affect the efficiency of participants in terms of the production of squares.

Fig. 1. Distribution of Completed Squares Across Treatments
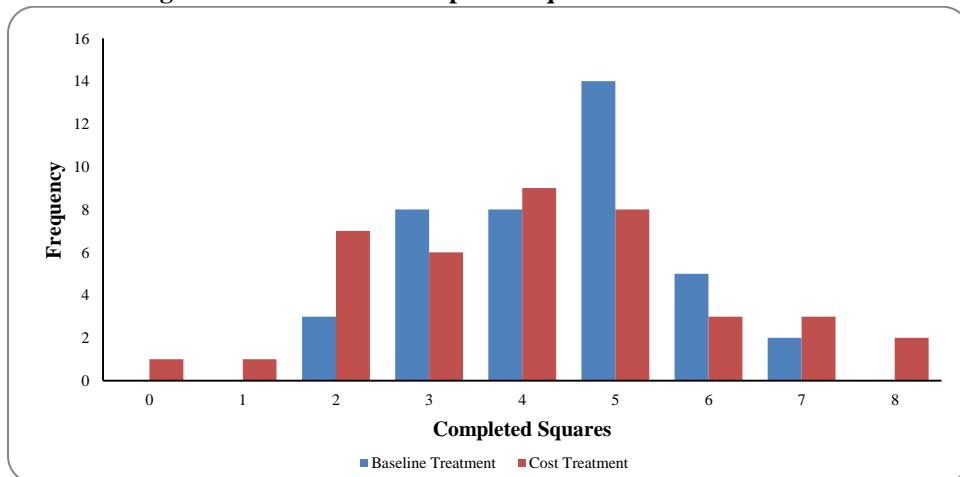
4.2. Distribution of Litter Pieces Inside the Waste Envelope Across Treatments

Figure 2 presents the distribution of litter pieces inside the envelopes across the treatments. We can see that the number of participants who did not use the waste envelope at all is higher in the Baseline treatment as compared to the Cost treatment. We also observe that more participants use the waste envelope for litter disposal in the Cost treatment than in the Baseline treatment. The mean number of litter pieces inside waste envelope in the Baseline and Cost treatments is 1.0 and 2.18, respectively.

Taking individual pieces of litter in the waste envelope as independent observations, the Wilcoxon rank-sum test shows that the distribution of proper disposal of litter in the waste envelop in the Cost treatment is significantly higher than the proper disposal of litter in waste envelope in the Baseline treatment ($p < 0.05$). This finding is in line with our hypothesis.

Fig. 2. Distribution of Litter Pieces Inside Waste Envelope Across Treatments
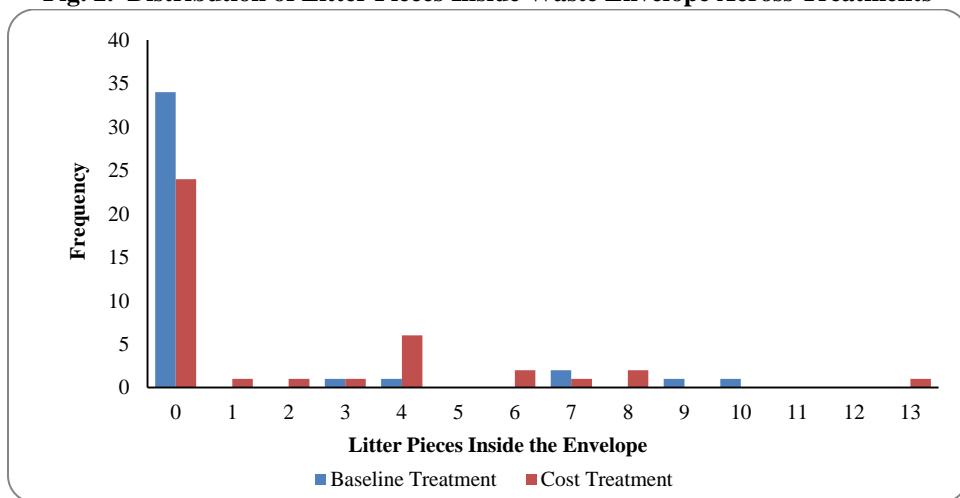
This result implies that littering without care is a general behaviour in the Baseline treatment. Conversely, this behaviour is not too common in the Cost treatment as some of the participants are more conscious of their littering behaviour. This shows that internalising private cost does indeed control littering behaviour.

4.3. Distribution of Litter Pieces Outside the Waste Envelope Across Treatments

Figure 3 presents the distribution of litter pieces outside the waste envelope across treatments. We can see that the number of participants who do not produce litter outside the waste envelope is high in the Cost treatment. On the contrary, there is a fair number of participants who littered outside the waste envelope in the Baseline treatment. Taking the number of waste pieces outside the waste envelope as independent observations, the Wilcoxon rank-sum test shows that the distribution of number of waste pieces outside the waste envelope in the Baseline treatment is higher than the distribution of number of waste pieces outside the waste envelope in the Cost treatment ($p<0.01$). Therefore, this finding is also in line with our hypothesis.

Fig. 3. Distribution of Litter Pieces Outsidethe Waste Envelope Across Treatments
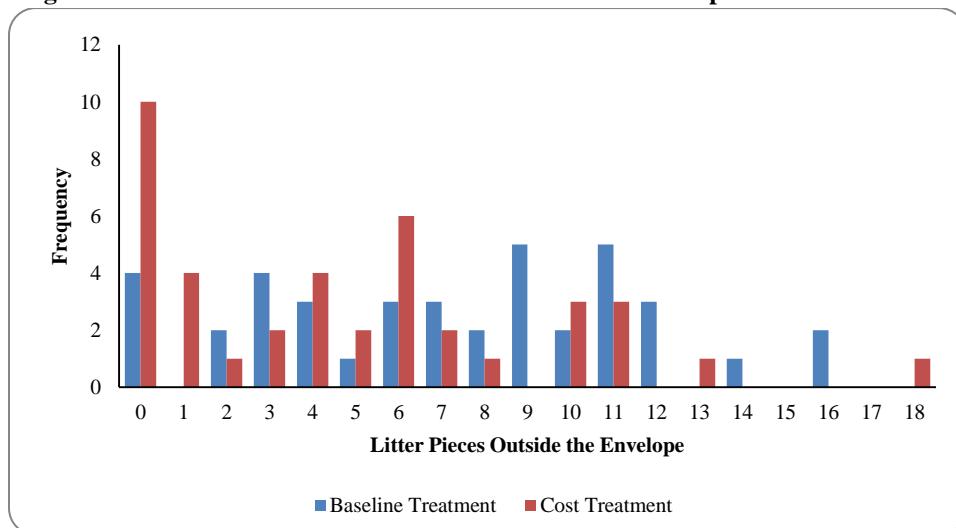
4.4. Total Waste Disposal Across Treatments

Table 2 shows the total number of completed squares, total number of litter pieces inside and outside the waste envelope across treatments. We can see that the total number of litter pieces outside the waste envelope is higher in the Baseline treatment (290 pieces) as compared to the Cost treatment (190 pieces). Wilcoxon Rank-Sum test shows that the sum of the number of litter pieces outside the waste envelope in the Baseline treatment is lower than the number of litter pieces outside the waste envelope in the Cost treatment ($p<0.05$). It is also worth mentioning that the number of squares is not affected much due to internalisation of the social cost. This shows that the internalisation of social cost make people litter-conscious without compromising their efficiency in the form of the production of squares.

Table 2

Total Number of Squares, Litter Pieces Inside and Outside
Waste Envelope Across Treatments

	Sum of Squares	Sum of Litter Pieces Inside Waste Envelope	Sum of Litter Pieces Outside Waste Envelope
Baseline Treatment	176	40	290
Cost Treatment	164	87	190

5. CONCLUSION

This study tests whether internalisation of the social cost of littering decreases the level of littering. We investigate the answer of our research question by conducting a controlled laboratory experiment. In the Baseline treatment, the participants are asked to cut as many squares as possible within a mentioned time in return for a monetary reward with no cost for littering. In the Cost treatment, participants bear monetary cost for littering.

We find that most of the participants in the Baseline treatment did not bother to open the envelope labeled "Use Me for Waste Material". They littered the area around them. On the other hand, participants in the Cost treatment mostly put the litter pieces in the waste envelope without compromising on the number of squares. The findings support our hypothesis indicating that littering is more frequent and common when the private cost to littering is not internalised as opposed to when there is a penalty for littering.

The results of the study have implications especially in those areas where litter is a significant problem, e.g. academic institutions like the Quaid-i-Azam University, Islamabad. It is suggested that in order to discourage littering behaviour and achieve environmentally favourable outcomes, one step in the right direction would be adequate provision of waste baskets complemented by imposition and implementation of fines on littering. If monetary fines are not possible, then developing a norm among faculty and students to criticise individuals who are littering is also likely to work. In other words, the study also suggests that where formal institutions are weak, activities having negative externality could be curtailed through informal institutions such as social norms and peer effect. Nevertheless, the limitations of the study are that littering behaviour could depend on gender, risk preferences and demographic features, which we did not control for.

There is also scope for further study on the subject matter by addressing it from different perspectives and by refining the experimental model further. A few suggestions towards that goal would be to see how results differ if the size of the waste envelope is increased/decreased, the average age of the control group is altered, the time for the participants for cutting the squares is increased, or the introduction of a heavier fine on the litterers.

APPENDIX A

INSTRUCTIONS FOR BASELINE TREATMENT

You are now taking part in an economic experiment. Please do not talk or communicate in any way with other participants during the experiment. Please also remember to turn off your cellphones. Should you have any questions, please raise your hand and one of us will come to assist you. At the end of the experiment one of you will be randomly selected and paid in cash in private for your participation.

Although there are many people participating in today's experiment, everyone is working independently. This means that if you are the one who is randomly selected, your earnings will be based entirely on your decisions—what the others do has no effect on your earning. It is therefore important that you take your time to understand the instructions.

In the experiment you are required to cut as many rectangles drawn on the coloured sheets provided to you as you can with in the span of 3 minutes. You will use the scissors provided to you to do this. The time will be measured using the clock in front of you. You will be asked to stop cutting as soon as the three minutes time is over.

At the end of 3 minutes one of you will be selected at random. For this purpose you will write your seat number on a piece of paper and put it in a box. One of the experimenters will randomly pick one number in front of you from that box. If you are the one who is randomly selected in the draw, you will be paid Rs.10 per completed rectangle.

Below are two examples to help you understand the experiment. These examples are not meant as a guide for behaviour in the experiment.

Example 1

Assume that you cut 15 rectangles within 3 minutes and at the end of 3 minutes you are the one who is randomly selected in the draw. Your earnings at the end of the experiment will be 15*10= Rs.150 which will be paid to you in cash in private at the end of the experiment.

Example 2

Assume that you cut 15 rectangles within 3 minutes and at the end of 3 minutes you are NOT the one who is randomly selected in the draw. Your earnings at the end of the experiment will be NIL.

If you have any questions, please raise your hand to attract the attention of one of the experimenters. Otherwise, please proceed to answer the questions below. Once you have finished answering the questions, please raise your hand and one of the experimenters will come to check your answer.

Control Questions

(1) If you have completed 6 rectangles by the end of three minutes and your seat number is selected at random, how much will be your earning?

Rs 0   Rs 60   Rs 100

(2) If you have completed 6 rectangles by the end of three minutes and your seat number is <u>not</u> selected at random, how much will be your earning?

Rs 0   Rs 20   Rs 60

INSTRUCTIONS FOR COST TREATMENT

You are now taking part in an economic experiment. Please do not talk or communicate in any way with other participants during the experiment. Please also remember to turn off your cellphones. Should you have any questions, please raise your hand and one of us will come to assist you. At the end of the experiment one of you will be randomly selected and paid in cash in private for your participation.

Although there are many people participating in today's experiment, everyone is working independently. This means that if you are the one who is randomly selected, your earnings will be based entirely on your decisions—what the others do has no effect on your earning. It is therefore important that you take your time to understand the instructions.

In the experiment you are required to cut as many rectangles drawn on the coloured sheets provided to you as you can with in the span of 3 minutes. You will use the scissors provided to you to do this. The time will be measured using the clock in front of you. You will be asked to stop cutting as soon as the three minutes come to an end.

At the end of 3 minutes one of you will be selected at random. For this purpose you will write your seat number on a piece of paper and put it in a box. One of the experimenters will randomly pick one number in front of you from that box. If you are the one who is randomly selected in the draw, you will be paid Rs.10 per completed rectangle.

However, Rs 5 per piece of extra paper found around you will be deducted from your total earning.

Below are a few examples to help you understand the experiment. These examples are not meant as a guide for behaviour in the experiment.

Example 1

Assume that you cut 15 rectangles within 3 minutes and at the end of 3 minutes you are the one who is randomly selected in the draw and you have no pieces of extra paper on your desk or down on the floor. Your earnings at the end of the experiment will be 15*10= Rs 150 which will be paid to you in cash in private at the end of the experiment.

Example 2

Assume that you cut 15 rectangles within 3 minutes and at the end of 3 minutes you are the one who is randomly selected in the draw, but you have 2 pieces of extra paper on your desk or down on the floor. Your earnings at the end of the experiment will be 15*10= Rs 150 – (2*5) = Rs.140 which will be paid to you in cash in private at the end of the experiment.

Example 3

Assume that you cut 10 rectangles within 3 minutes and at the end of 3 minutes you are the one who is randomly selected in the draw, but you have 20 pieces of extra paper on your desk or down on the floor. Your earnings at the end of the experiment will be 10*10= Rs.100 – (20*5) = 0 and you will not be paid any money.

NOTE: There is no negative earnings in the experiment. For example if you have 30 piece of extra papers on your desk or down on the floor in Example 3 and you are the one who is randomly selected in the draw, your earnings at the end of the experiment will also be 0.

Example 4

Assume that you cut 20 rectangles within 3 minutes and at the end of 3 minutes you are NOT the one who is randomly selected in the draw. Your earnings at the end of the experiment will be NIL.

If you have any questions, please raise your hand to attract the attention of one of the experimenters. Otherwise, please proceed to answer the questions below. Once you have finished answering the questions, please raise your hand and one of the experimenters will come to check your answer.

Control Questions

(1) If you have completed 6 rectangles by the end of three minutes and no extra piece of paper is found on the desk or down on the floor in front of you; moreover, if your seat number is selected at random, how much will be your earning?

Rs 0   Rs 60   Rs 100

(2) If you have completed 6 rectangles by the end of three minutes and your seat number is selected at random, but 1 piece of extra paper is found on the floor in front of you, how much will be your earning?

Rs 0   Rs 55   Rs 60

(3) If you have completed 6 rectangles by the end of three minutes and your seat number is <u>not</u> selected at random, how much will be your earning?

Rs 0   Rs 20   Rs 60

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Book Reviews

A Review of Contributions of Friedrich List Commemorating his 225-Year Anniversary.[1]

A Practical Prophet

Friedrich List was a German-American economist who considered economics a science of politics and culture. As a modernist, he promoted an urban-industrial society, through gradual and pragmatic policies. He had considerable impact on a geopolitical scale, and his theories contributed to significant changes in the international balance of powers.

For a good reason, the textbooks of mainstream Anglo-American economics weeded out the German-American economist Friedrich List (1789-1846). Why? Because List gave away the family secret. List described its details, reasons and logic. The treasure to be kept secret was, and is, the strategy to accumulate national wealth and power. List has thus been characterised as:

> … a prophet of the ambitions of all underdeveloped nations. [Laue (1963), p. 57].

List spent his life trying to uncover and explain to the people in Germany and in the USA how they could evade and eventually overcome English superiority and domination, economically and politically by using the method that England herself had used (while pretending otherwise).

The Human Creative and Collaborative Spirit

List is known generally for his support for railroad construction and for temporary protection of infant industries, pragmatically adapted to his stage theory. But there is far more to be noticed on deeper levels, connected to his 'Image of Man'. According to List, and a long tradition in Continental European statecraft, the goal of political economy is to elevate the culture of a nation. In other worlds, the goal of political economy is also to critically encompass the non-material aspects of an economy. List's liberal individualism and love of freedom and tolerance, connects to a German tradition where individual freedom translates more into a freedom to create (for mutual benefit), than into a freedom to consume (for egotistical benefit).

The background for the aforementioned family secret is "another" reason why List has been "forgotten": His emphasis on the immaterial factors underlying economic development. This pleased economists e.g., in Japan, Russia, China and India, who were dissatisfied with "Western materialism", as in the traditions following Adam Smith and Karl Marx.

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[1]To be celebrated in his birth town Reutlingen, Germany under the authorship of Prof. Dr Eugen Wendler, Oct. 8th–10th, 2014.

Materialism's Increasing Insignificance

Mainstream economics and Marxism, however, have been walking the path of Materialist philosophy, thereby ignoring the creative and collaborative powers of the human spirit, and making it increasingly insignificant. Mainstream economics has helplessly been trying to emulate mechanistic (Galilean-Newtonian) physics of the 18th and 19th Centuries. List's belief in the human spirit did not fit this template, and thus he was deemed 'unscientific' and obscure.

Today, however, the mechanistic model for sciences, also in Physics, is outdated by far, and main-street economics is rediscovering the power of the mind (cf. the 'Solow residual' [Solow (1957), p. 320] and now popular concepts like 'innovation', 'knowledge', 'learning', 'communication', 'governance' etc.), albeit, without allowing this insight to enter standard textbooks, nor noticing the structural coherence and logic that List developed in his 'immaterially' or 'spiritually oriented' system. It is about time to rediscover List and his roots in contemporary philosophy: 'German Idealism', also called 'the German Renaissance'.

List criticised Smith for his materialism, and logical results following from materialism: reductionism, methodological individualism, and social nominalism (atomism), and a gospel of egotistical greed. List argues that Smith's generalisations on a materialistic basis laid the foundation for abstraction, formalisation and 'monetarism'. This led to a myopic exclusion of non-material factors of importance, such as innovation, morality, trust, collaboration, institutions, and the need for public regulation.

List also criticised Adam Smith for not understanding the largely non-material nature of capital, thus not understanding growth and development [List (1841), pp. 225–226]. Smith, thus, adhered to a counterproductive policy of saving and austerity [Smith (1776), Book II, Ch. V, p. 366]—mistakes inherited by modern economists [cf. Daastøl (2011), Ch. 4]. As Joseph Schumpeter noted, the English classical school (after Smith) was,

> … unsurpassed in its baldness, shallowness and its radical lack of understanding for everything that moves man and holds together society, … [Schumpeter (1912), p. 87].

The National System of Innovation

Unlike Smith and Marx, List had a broad practical background, as reflected in his 'non-generalising' approach to production. As opposed to Smith's simplistic mercantile theory of 'buy cheap and sell dear', List developed a complex theory of the productive forces, where the conceptual core was the 'Confederation of Labour'. Quite telling of List's inclinations, his system was later termed the National System of Innovation [Freeman (1982)].

According to List, the spiritual or intellectual capital of a nation, its labour force, is the core of its productive forces, contributing to both material and non-material growth. Goal and focus, also in times of crisis, must thus be to elevate the productive powers and accordingly elevate labour, i.e. increase the quality of labour. However, 'intellectual' or 'mental' capital can only be gathered slowly and with great difficulties. It is fragile, perishes easily, and must be nurtured and protected

from disruptions. Any short term or even brief destruction of Labour's productive power will also be destructive of nations' economies in the long term and must be avoided.

List's productive system may be condensed as following:

List argues that the human spirit creates culture, and this creates wealth:

(1) The task of political economy is to perfect global civilisation through gradual moral, intellectual, and material progress.

(2) Mental capital is the fragile and prime source of the productive forces and wealth. It constitutes the essence of collaboration.

(3) This Confederation of Labour constitutes and continuously reshapes civic and public institutions.

(4) The Nation is the main vehicle for the individual person's quest for freedom, security, happiness and wealth.

(5) The ultimate Confederation of Labour lies in global free trade, making the selfish colonial system as well as navies obsolete.

The Listian Principle—Elevate Labour

List's remedy for re-establishing a sound balance was to industrialise by elevating labour and civilisation itself. In this way, a nation may progress, avoid trade deficits, debt bondage, and social misery and even rise again from such unfortunate circumstances. This is what the USA once did.

List explains the core principles of mobilising capital for productive purposes in practice, also through the money creation process. Other tools in this pursuit were public measures like protective tariffs and targeted investment in public goods, like education, infrastructure, energy, and machine tools and a financial system serving productive purposes, all contributing to stable growth. List explains the principles of how a nation must prioritise in her investment strategy, strategically using its human and material capital productively, all in order to elevate national Labour—and ultimately global civilisation.

List argued that the first role of public regulation, such as tariffs, was to protect primarily the home market and production—in particular "spiritual capital", "human capital" and know-how in a wider sense. The second role was to restructure the industrial makeup of a country. Obtaining revenue for the authorities only came third. Restructuring is particularly relevant in a state of crisis, which often is due to a dysfunctional industrial structure. A crisis is thus an opportunity to invest for restructure, as Wilhelm Lautenbach argued [an admirer of List; Lautenbach (1931), Section IV].

List's 'National System'

List wrote a handful of books and hundreds of essays and articles on economic issues related to national development, and thus connected both to intricate problems related to international relations, as well as to issues of very local natures, such as land reform.

List's perhaps most interesting book also is his most famous book, *'The National System of Political Economy'* [List (1841)].[2] The book pretty much sums up his message

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[2]The book does not deal much with one of his main preoccupations, innovative transport, but several

and the *Introduction* does so in particular.[3] But even people who are well versed in List's ideas have forgotten some intriguing sides of this practical and principally oriented book [List (1841)].

List begins with an historical overview of the rise and fall of great nations, he then discusses economic theory thirdly the economic systems until his days, and finally international politics, mainly related to England's relations with the USA and the European Continent. List's method is foremost empirical, extracting principles for sound economic development by comparing historical cases, such as those of France, Spain and England.

International Imbalances, Debt and Dependency

Through its emphasis also on financial issues, in particular the discussion of America's debt crisis in the 1820s, the book stands out among List's other works. It happens to be a very relevant book to the present situation—of international imbalances and national debt problems. In 2004, Chris P. Dialynas wrote a highly profiled article on PIMCO's web pages[4] praising List's realism and degrading Adam Smith's phantasies.

List's ideas are of great importance today. The global trade imbalances and wealth transfers that concerned List are most prevalent today. [Dialynas (2004), Ch. 5A].

Adam Smith had argued against the Mercantilists, that the international markets would automatically find their way back to balance, and required no political intervention.

Nothing, however, can be more absurd than this whole doctrine of the balance of trade, upon which, not only these restraints, but almost all the other regulations of commerce are founded. [Smith (1776), Book IV, Ch. iii, Part ii].

Friedrich List however, using historical examples, argued that the trade and payments balances were important warning signals for the success or failure of a national economy, and the potential for dependency or continued sovereignty and national welfare. He also gives the key to a solution: industrialisation based on national power of mind.

The debt situation that many countries are suffering principally needs no different solutions than those achieving normal growth, except that the difficulties are more severe in that there is also an unproductive debt burden to be served. List advocates productive investments to get out of a debt crisis because the debt situation is caused by a lack of growth and can only be treated with increased growth.

When dealing with debt crises in the spirit and insights of Friedrich List, the guiding principle should be that short term measures must contribute to and conform to long term goals and evaluated accordingly.

List argued that only self-sufficient nations could achieve sovereignty and prosperity. Since most nations have to trade abroad to access raw materials and markets,

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essays and books deal with this.

[3]Strangely omitted from the English translation of 1885, but to be found in Margareth Hirst's translation [Hirst (1909), also online].

[4]*Pacific Investment Management Co.*, the world's largest bond-investment firm. This article was much noticed and commented, and was placed on top by *Reuters* in their annual review of the financial experts' forecasts for 2005. It was followed up by an interview in Forbes [Ackman (2005)].

the requirement thus transforms into having a positive balance of trade, i.e., to escape debt servitude nations must produce and export.

Smaller countries need to make treaties and unite, eventually into continental alliances, and ultimately leading to global free trade and peace. Nevertheless, he argued, premature free trade results in monopolies of the strongest. For stability and defence against foreign superiority, state intervention is required, e.g. temporary protection of home markets and building infrastructure, thereby elevating the quality of labour and competitiveness of industry.

Like the US founding father, Alexander Hamilton (1755–1804), List also argued that "imperialism" can be used to develop poor countries. One prerequisite is good institutions that are able to control capital flows.

We can learn a few things from Friedrich List's solution to America's debt crisis in the 1820s; mobilising regulation and capital for an elevation of Labour; productive sectors must be prioritised, and finance must be controlled in the interest of the nation.

Today as in List's days, there are social and political issues at stake, and even geopolitical issues of grand proportions, regarding the relative positions of e.g. the USA, the EU and China and their respective currencies. Any interested person may benefit from re-reading Friedrich List.

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Ilhan Niaz. *The Culture of Power and Governance of Pakistan 1947–2008.* Karachi, Pakistan: Oxford University Press. 2010. 320 pages. Pak Rupees 595.00.

"The Culture of Power and Governance of Pakistan 1947–2008" by Ilhan Niaz makes a strong case for the quotation, "the one who does not remember history is bound to live through it". In the book, the author has tried to trace the current culture of power and governance in Pakistan through the rich history of the subcontinent. He has asked the question that why the State of Pakistan is constantly losing its writ as many incidents, such as the "Laal Masjid" debacle, are challenging the writ of the state. He has also analysed why State of Pakistan is always facing issues in domains of administration, legislation, execution and judiciary. These issues are becoming existential threat to the Pakistani State. The author has blamed the rulers of Pakistan who behave like "Bureaucratic Continental Empires".

In this book, Niaz has gone through the annals of history to discuss the nature of bureaucratic states that were prevalent in the Asian, African and European continents. Bureaucratic continental empires were directly dependent on the rulers and these rulers treated their states as "personal estates". Rulers employed massive state machinery like military, spy agencies, and bureaucracy to sustain their rules. All these rulers had to show very stern attitude towards their masses to curb rebellions and secure their "personal estates". These states could break up into smaller states if rulers did not use coercion or other aggressive and violent measures. Rulers used arbitrary use of power without regard to law and order. Religion was generally used to create basis for ideocracy.

Niaz has argued in the book that the rulers of Pakistan behave like the bureaucratic emperors of the past, without any regard for proper rules, law and order. On the contrary, he has praised the British Colonisers who bestowed their "State of Laws" upon the people of the subcontinent. British emperors established certain institutions like judiciary, legislation, and an excellent civil service, according to the author. They built Indian civil service on the principle of merit and this civil service was mostly free of corruption. They introduced budgeting processes and several steps for a successful fiscal policy in the Indian subcontinent. They also maintained the civil supremacy over military and established the idea that institutions cannot intervene in each other's defined roles. The author has praised the British colonisers for giving these "civilised institutions" to administer India and how these institutions created conducive environment for law and order. However, it is interesting to note how the author has ignored the divide and rule policy employed by the British government to rule India. He has asserted that the Indian experience of colonisation was less "cruel and tragic" as compared to the experiences of other colonised world. This assumption may have served the author's purpose to prove his point but he has conveniently ignored many other important points. For instance, the British government introduced many laws of social and religious nature after which pluralistic outlook of India was damaged beyond repair and with serious repercussions for future.

The author has argued that after independence rulers of Pakistan gradually adopted highly arbitrary methods in the running of this country and the state became the personal estate of rulers. He has quoted an example where a convention was presented in the constituent assembly in 1947 that equated Jinnah's personality, popularity and authority with the government. This convention was the first instance in Pakistan that made a

person synonymous with the government. The author has also drawn a comparison between pre- and post-partition civil services. According to him, the civil service was highly efficient, effective and incorruptible in the pre-partition era but after the partition, there was a high influence of politics in administrative matters. Federal Public Service Commission and other provincial commissions became highly politicised. He has argued that Zulfiqar Ali Bhutto totally demoralised civil service in the name of democratisation and equality. Steps like seniority-based upward mobility, standardised pay scales further deteriorated already demoralised civil service. Since then, every successive government has taken highly arbitrary steps that have politicised the civil service beyond repair.

The author has also discussed the role of army in the management of governance. Earlier, in the pre-partition era military was not involved in the executive part of the country but after partition army was inducted into federal cabinet and ministries like defense were handed over to military to create their monopoly. The author is of the opinion that military is much more united as compared to civil institutions and hence this institution has been more influential in the state's decisions. He has given the notion that military has been less interested in political meddling and civilian leaders are responsible for dragging them into politics. It is interesting to note, however, that today army has built various mega projects that influence the political economy of Pakistan. Moreover, the army has also dominated many important civilian posts in various institutions.

The book has also discussed the historical role of judiciary in Pakistan. The author has described the process of how executive power has influenced the legislative and juridical part of law and has compared the efficiency of justice system of British era with that of post-partition Pakistan. He has argued that the British government maintained a speedy justice system whereas under the current justice system in Pakistan, it can take more than five years to solve a single case. Judiciary has also adopted the doctrine of necessity from time to time, which validated the army rule and jeopardised the future of democracy in Pakistan. According to the author, the justice system has worked arbitrarily in Pakistan where the justice is highly dependent on personal decision of the rulers instead of rule of law. Institutions, which ensure the rule of law such as police, are perceived to be most corrupt institutions of country.

Commenting on the fiscal administration in the contemporary Pakistan, Niaz argues that Pakistan has a highly centralised system of fiscal decision-making and even in times of devolution, the fiscal plans have had highly centralising tendencies. He is of the opinion that the provinces have never demonstrated any willingness to take responsibility of their subjects. The book has also highlighted prominent leakages in the tax collection system, which is costing Pakistan dearly. According to an estimate given in the book, about 10-12 percent in tax-GDP ratio is being lost because of corruption in the taxation system.

Moreover, the author has also lamented that fact that the strong colonial institutions have been discarded only because they were given by the British government. There have been a lot of efforts to handle the growing governance crisis in Pakistan but mostly the efforts have been highly arbitrary and without any substance. Today, most of Pakistanis believe that government institutions are highly corrupt and inefficient and this is the reason that they do not go to any state institution for help. This dysfunction is the most prominent phenomenon which cuts across rise and fall of Pakistan's administrative institutions.

This whole situation may be summed up by arguing that all Pakistani rulers, be they bureaucrats, politicians or soldiers, share one common prolonged inability to understand the structural and operative autonomy of all institutions. This inability has resulted into dysfunctional institutions which undermine the ethos, professional integrity and esprit de corps of the state apparatus.

Overall, "The Culture of Power and Governance of Pakistan 1947–2008" is a good read for students, policy-makers, academicians and laymen who are interested in history, politics and economics. Nonetheless, Ilhan Niaz's whole thesis can be contested on some points. For instance, he has not talked about the role of capitalism in building of states where he has argued that bureaucratic empires perish because of weak rulers. Many political philosophers believe that capitalism did not exist in its current form in previous centuries, which is the reason that there was no conception of current state setup in those days. Author has not taken into account the role of capital and changes in mode of production and its impact on nature of state. Further, the author has stated that there was no law in the bureaucratic empires and the arbitrary rule of law is a creation of the eighteenth century Europe, he has perhaps not paid attention to the laws like Torah law, Cannon Law and ecclesiastical law. And most importantly, the author's argument is deeply flawed in understanding the purpose of British Empire in India. British Empire used the laws of capitalism to maximise the outflow of raw material and capital from India. It was this resource extraction which actually built the structure of the British rule of law and governance. Not all the investments were there to civilise the "uncivilised" but to extract maximum out of the subcontinent. All these issues are not addressed in this book and it is hoped that future work will include all these relevant crucial questions.

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Jean Drèze and Amartya Sen. *An Uncertain Glory: India and its Contradictions*. Princeton: Princeton University Press. USA. 2013. 448 pages. $ 29.95.

The spectacular performance of India in terms of economic growth has generally been a source of pride for the Indians as a nation, in addition to attracting significant international applause. Drèze and Sen, on the contrary, question the justification of lauding Indian performance in their book, 'An Uncertain Glory: India and its Contradictions'. In their book, they focus on the performance parameters that actually reflect standards of living of Indian population. Their analysis portrays a shockingly dismal state of affairs for a vast majority of citizens of the country. The book disillusions the reader about the projected image of Indian development through a detailed yet objective discussion on specific issues plaguing the social sector of the country. The discourse throughout is substantiated by extensive statistical evidence, in addition to a comprehensive statistical appendix given at the end of the book.

The book starts with the acknowledgement of India's historic progress on the economic front. The authors then justify the title of the book by reflecting on the sustainability of these glorious achievements because of absence or inadequacies of efforts directed towards removing hard-set malaises impeding efficient working of the economic and social systems in the country. The book also adequately highlights the distinction, as well as interdependence, between economic growth and sustainable development. Moreover, it also comments on the relative placement of India in international context with regards to progress on various social indicators. The authors then take the readers on a ride to look at the characteristics and progress of Indian economy on different fronts, such as accountability and corruption, education, health, poverty and social support, inequality and democratic practices, devoting a chapter to each of these issues.

The importance of a well-functioning public sector to cater especially to the needs of the underprivileged in the country is stressed throughout the book but the issue of accountability is highlighted as a major catch in this regard. The institutional reforms proposed to improve performance of the public sector cover three main areas, namely transparency and accessibility of information, promoting social environment for intolerance of misdeeds, and legislative measures to prosecute and punish the wrongdoers.

With respect to education and health, the authors favour active role of public intervention in providing the baseline as well as for improving the standards of performance in these areas before, if any, private investment is allowed in these sectors. The often proposed schemes of school vouchers for universal education or health insurance in an environment of private provision of education and health facilities are strongly denounced by the authors on the basis of 'public good' characteristics of health and education. Moreover, international experience in this regard is also highlighted to call for a larger budgetary allocation for health and education as well as the development of public provision in these sectors until they are strengthened enough to avoid predatory profit exploitation by the private sector.

In the domain of social support for the poor, the book contends that both 'market mania' and 'market phobia' may be unfair in deciding upon the tools to cater to the needs of the under-privileged. Assessing the strengths and weaknesses of Public Distribution

System (PDS), Conditional Cash Transfers (CCTs), and National Rural Employment Guarantee Act (NREGA), the strengthened PDS is seen as a promising form of social support. The authors conclude that, in any case, the poor should not be left on their own to struggle on their way out of destitution; some form of 'support' for the poor is indispensable.

A particularly striking feature of Indian economy highlighted in the book is the large scale and multidimensional inequality that is historically prevalent yet inadequately addressed. Inequalities range from the domain of income to gender, caste, education and even to the knowledge of English. And all of these different forms of inequalities tend to feed each other, forming a vicious circle of multiple deprivations. The depressing feature associated with inequalities peculiar to Indian case is not the abundance available to the affluent few but the utter lack of even basic necessities for a decent living for a vast majority of Indian populace. Gravity of the situation is aggravated by the lack of public debate on issues concerning the destitute owing to their under representation, and in some cases non-representation, as an identity group which causes failure of the needs of the indigent to earn recognition on political front. The widely applauded Indian democracy also proves far from being well-functioning in this regard, calling for an initiation of extensive public reasoning, facilitated mainly by the media, to highlight the needs of the underdogs in the society and the subsequent political debates on policy proposals for required remedies. In the end, the book stresses the need for impatience in getting these social issues solved to get the troubled stratum of the Indian society out of the miserable state of affairs it is currently in and to build human capabilities if the country wants to enjoy economic growth in the long run.

The major strength of this book lies in the statistical support and thorough referencing of the evidence presented. Moreover, the arguments are placed in context by international comparisons as well as comparing performance of different states within India, which enhances the reader's comprehension of the nature of the problem. In addition to being an engrossing and captivating read throughout, the book is praiseworthy for a generally hopeful perspective on the dismal state of affairs. The practical suggestions for improvements drawing from international and national experience leave the reader optimistic about the consequences of struggling for a change for the better.

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Shorter Notice

Ariel Rubinstein. *Economic Fables.* Cambridge, United Kingdom: Open Book Publishers. 2012. 264 pages. U.K. £ 8.95.

"Economic Fables" is written by Ariel Rubinstein, professor of economics at the Tel Aviv University and the New York University. The book is divided into six chapters, including the introductory zero chapter. The author employs autobiographical accounts and personal experiences to help clarify difficult concepts in economic theory. The book aims at linking economic theory and economic models to real life through personal experiences, anecdotes and observations. The book revolves around themes in elementary Microeconomics and basic concepts in Game theory and the author presents his insights into policy making at the end of the book. It is overflowing with the writer's personal narrative and the reader comes across glimpses of the authors life, family, relationships, life in Israel, Jewish traditions and the author's own political views throughout the book. Many of the views presented in the book are disparate from mainstream economics as the author proclaims. In introductory chapter, the author contends that economic models are not meant to predict the future or human behaviour rather they study in detail the considerations ordinary people have while making ordinary choices, or in the author's words, economic model study logic of life. In chapters one to five, Rubinstein discusses various concepts related to microeconomic theory and tries to make them simple for the reader by relating the concepts to his personal experiences. Regarding rationality, he contends that decision makers may be maximising an unknown objective function, which in many cases may not even be the one that maximises their happiness. The other concepts he analyses in detail include game theory, competitive equilibriums and their efficiency, Pareto efficiency, and relation of economics with other disciplines. In the final chapter, Rubenstein comments on economic policy. He is of the view that there is no one "right" policy. One policy may positively affect the workers, harm the industrialists, or vice versa. There are disagreements regarding who should be prioritised when making policies and even the concepts such as justice and fairness have subjective definitions. The art of policy-making is achieving a fine balance between the desires of different groups and minimising the conflicts that arise due to a particular policy or lack of it. In reality, the author argues, ideological and moral concerns also affect a policy that sometimes has little to do with economics. He also comments on the problems of poverty, concentration of wealth and assets and land ownership. The concluding comments are made in the context of the State of Israel and the role that the Israeli government plays due to the extraordinary geopolitics of the state of Israel. He argues that such a situation makes it imperative for the government to involve itself actively in the economic matters. (*Sundus Saleemi*).