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Table of Contents (Volume 12, Issue 1)

Board of Directors Size, Independent Directors, and Firm Performance: Insurance Companies in Kazakhstan

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Abstract: This study investigates the relationship between selected characteristics of boards of directors—namely, size and percentage of independent directors—and the profitability of insurance companies in Kazakhstan, over the period 2012-2018.

This research uses monthly data on financial performance from the statistics published by the National Bank of Kazakhstan. The data on the boards' composition were hand collected from the files of the Depository of the Financial Reporting of the Ministry of Finance of Kazakhstan, and from the Kazakhstan Stock Exchange. The research uses panel data estimation with firm and time fixed effects. To mitigate endogeneity, generalized method of moments is applied.

The results show that board size relates negatively to the insurance companies' profitability, but it has a statistically significant positive association with the return on assets (ROA) during times of negative profits. The percentage of independent directors on boards does not show any significant association with profitability measures.

The results suggest that firms should be more efficient in using governance instruments and facilitate involvement of independent directors. Regulators should pay more attention to corporate governance reforms, especially in emerging markets.

JEL Classifications: M12, M14

Keywords: Firm Performance, Corporate Governance, Board of Directors, Independent Directors, Insurance Firms, Emerging Markets, Kazakhstan

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1. Introduction

This paper explores the relationship between the structure of the board of directors (BoD) and firm performance among insurance companies in Kazakhstan. The study focuses on the association between board size and percentage of directors who are independent and two profitability measures, the return on assets (ROA) and the return on equity (ROE).

The major theories in studies of board composition are agency theory (Jensen & Meckling, 1976), and resource dependence theory (Pfeffer & Salancik, 1978 and 2003). Agency theory suggests that boards of directors monitor whether managers act in the best interests of shareholders. It asserts that efficient boards decrease the information asymmetry between outside shareholders and firm managers who may reveal incomplete information to owners and may use firms' resources in their personal interests. Resource dependence theory suggests that boards are part of organizations and bring their "board capital" (Jermias & Gani, 2014) into firms in the form of advisory and consultancy services and access to their unique networks.

Despite researchers' interest in whether boards enhance firm performance, they do not agree on whether specific board characteristics improve firm performance. Some authors (e.g., Adams & Mehran, 2012) report a positive relationship between board size and firm performance; and some provide evidence of a negative relation (Staikouras, Staikouras, & Agoraki, 2007; de Andres, Azofra, & Lopez, 2005). Cheng (2008) explores the association between board characteristics and the variability of corporate performance. Elsayed (2011) draws attention to the fact that the relation between board size and the firm's performance must be examined in conjunction with other factors such as CEO duality. There is also no consensus on the impact of independent directors on firm performance despite the prescribed regulatory requirements of board inclusion of independent directors. On one hand, independent directors are expected to be better monitors since they are free from bias. On the other hand, such independence is difficult to achieve (Romano, 2005) or is hindered by the obstacles that outsiders face in acquiring full information.

Corporate governance in emerging markets is important for investors (Aguilera & Haxhi, 2019). The studies of corporate governance in Kazakhstan suggest that governance reforms have not yet resulted in financial market growth (Temirbayev & Abakanov, 2019), and raise concerns of insufficient transparency in state-owned organizations (Kemme, 2012). But they point to improvements of operating performance in line with changes in corporate governance in the post-financial crisis (Orazalin & Mahmood, 2019), and they report a positive impact of gender diversity on the quality of financial reporting (Orazalin, 2019). This study attempts to expand knowledge of corporate governance by exploring the impact of the structure of the board of directors on firm performance in Kazakhstan's insurance sector. As far as we know, this study is the first that focuses on the insurance sector of Kazakhstan that explores the impact of BoDs on firm profitability. Furthermore, this study explores the different degrees of involvement of directors during good and bad times (i.e., periods of positive and negative profit).

The paper is organized as follows. The first section introduces the insurance industry in Kazakhstan and outlines how corporate governance reforms were introduced into the country. The second part discusses the major theories that provide the basis for the current research and develops hypotheses. The third part outlines the methodology. Discussion of the findings and results in the fourth section conclude the paper.

2. Background

The insurance industry in Kazakhstan includes property-casualty and life insurers, which often are related to commercial banks. The property-casualty insurance sector got its impetus for growth in

2003[2] when the state made compulsory liability insurance for automobile drivers, whereby all vehicle owners had to purchase policies issued by an insurance company in Kazakhstan. Expansion of life insurers relates to the changes in the pension fund system, whereby they got permission from the regulator[3] to transfer the accumulated pension funds of individuals from the state-owned Pension Fund of Kazakhstan in 2014. Before then, life insurers were limited to selling policies to borrowers of the related commercial banks.

The insurance sector has been monitored by the country's central bank, the National Bank of Kazakhstan, since 1998. The law requires all insurance companies to participate in the Insurance Indemnity Guarantee Fund to ensure the reliability of the sector for the population. In line with the general requirements for solvency and organizational structure, the insurers and other financial companies must prepare their financial reports in accordance with the International Financial Reporting Standards[4] and present the intermediate reports monthly. According to the National Bank of Kazakhstan, the total assets of the insurance industry represented 1.78% of the country's gross domestic product as of January 1, 2019; insurance premiums were 0.8% of GDP, and the insurance premium per capita was 20,920 tenge, which is less than 55 U.S. dollars[5]. The ten largest insurance companies count for 83.7% of the market's total assets, 81.5% of total equity, 72% of total insurance premiums, and only 66% of total insurance payments. The ratio of insurance payments to insurance premiums varied from 29% to as low as 18% in 2018. Over the period 2012-2018, total assets of the sector denominated in tenge have demonstrated an average annual growth of 13.6% per annum; the figure is to be taken with caution in light of the national currency's devaluation of more than 150% since January 1, 2012. (The largest rate of devaluation, 85%, was in 2015, after the National Bank decided to let the tenge float.) The devaluation has eaten up a large portion of the sector's retained earnings, which dropped from 162.1 billion tenge in 2015 to 57.5 billion tenge in 2016. The devaluation prompted an increase of the contributed share capital of more than 50%, from 85.5 billion tenge in 2015 to 129.3 billion tenge in the following year, reaching 147 billion tenge by the end of 2018.

2.1 Corporate Governance Reforms in Kazakhstan

Corporate governance is a relatively new issue in Kazakhstan. Among the governance problems summarized by B. Djamishev, the ex-Chairman of the Agency of the Republic of Kazakhstan on Regulation and Supervision of the Financial Market and the Financial Organizations,[6] is control over boards of directors by the firm's executives, observed together with high ownership concentration in the sector. Intending to address low transparency and inadequate protection of minority owners, the National Bank required the financial industry to adopt the Corporate Governance Code, using the template prepared by the regulator following principles of the Organization of Economic Co-Operation and Development (OECD) in 2005.

Although such measures resulted in quick implementation of the OECD recommendations, the efficiency of the reforms is questionable. By distributing the governance template, the regulator triggered a rather formal approach that did not bring practical results. As one of the professionals working in an investment company described,

> "Many of them [local companies] do this just to tick the boxes—to submit a formal report or to get into the Kazakh Stock Exchange's listing. As a rule, they copy the code of corporate governance from a more developed company or Western company, coarsely

[2] Law of the Republic of Kazakhstan № 446-IWE dated 01.07.2003, "On Required Liability Insurance of the Owners of Automobile Vehicles."
[3] Decree #32 of the Executive Board of the National Bank of the Republic of Kazakhstan dated 26 February, 2014.
[4] The requirement to submit financial reports in accordance to IFRS to all joint stock companies was introduced by the Law of the Republic of Kazakhstan #329 dated 24 June, 2002.
[5] KZT/USD was 384.2 as of 01 Jan. 2019 (official rate of the National Bank of the Republic of Kazakhstan).
[6] The report is available in http://www.corpgov.kz/img/jamishev.pdf

adapting it to Kazakh reality. It is superfluous to talk about the real adoption principles of corporate governance specified in similar documents that are being borrowed."[7]

According to the report of the International Finance Corporation on corporate governance in Kazakhstan in 2010[8], 56% of respondents, employees of commercial banks, were not even familiar with the key corporate governance documents. The report of the European Bank for Reconstruction and Development (2017)[9] points to the absence of evaluation of the board of directors; low power of directors, who are often overruled by the executives; directors' absentia; and poor law enforcement of fiduciary duties of board members. Nevertheless, as Orazalin & Mahmood (2019) report, economic motivations became more salient in the post-crisis period after 2009, improving corporate governance in banking that raised the banks' performance in social responsibility reporting. Nevertheless, problems exist. One weak point is the low capacity of independent directors, who are appointed and dismissed by the sole or dominant shareholder (Lukin, 2015).

The country's legislation[10] imposes specific requirements for the composition of boards of directors. A board must consist of at least three members, with not less than 30% of directors being independent. Independent directors must have at least three years of experience in the financial sector or in a regulatory agency. A large shareholder is not allowed to serve as the chief executive officer, and the CEO cannot chair the board of directors. No member of the executive board can be a member of the board of directors. Specific requirements for gender or ethnic diversity are not prescribed. Overall, the regulations impose the most desired characteristics for boards of directors in line with international corporate governance practices.

3. Literature Review and Hypotheses Development

3.1. Agency Theory and the Board of Directors as a Monitor

The role of boards of directors is often studied within the framework of agency theory proposed by Jensen and Meckling (1976). When ownership and control are separated, managers have incentives to use their firm's resources in their own interests. The board of directors is supposed to monitor managers' performance and protect the interests of owners. Accounting scandals at the beginning of the 2000s triggered studies of corporate governance and of the monitoring role of directors. Hermalin and Weisbach (2003) suggest that "boards are a market solution to an organizational design problem… that helps to ameliorate the agency problems that plague any large organization" (p. 9). They note that boards of directors have not been eliminated through economic mechanisms throughout the history of the corporate world. Firms often have boards with more directors than regulations require, suggesting that BoDs are not obsolete.

Agency theory explains how the board of directors influences firm performance. Their monitoring on behalf of shareholders reduces agency costs and improves firms' decisions and operations. In resource dependence theory, directors provide resources to firms in the form of expertise, knowledge of the market, and communication networks. Firms employ the “board capital” to enhance their performance.

Several studies are devoted to board characteristics that are associated with superior firm performance, but the results are contradictory. The most common factors studied are board size, percentage of outside directors, and board diversity. Adams and Mehran (2012) report a positive relationship between board size and performance in large bank-holding corporations. Cheng

[7] Anastasiya Raziyeva, lawyer of the Premier Asset Management company. Corporate Governance. Kazakh Reality. KAZAKHSTAN International Business Magazine №4, 2007. Available at http://www.investkz.com/en/journals/54/448.html

[8] The International Finance Corporation. (2010). Survey of Corporate Governance Practice in Kazakhstan. World Bank.

[9] Cigna, G.P., Kobel, Y., Sigheartau, A. Corporate Governance in Transition Economies. Kazakhstan Country Report. December 2017. European Bank for Reconstruction and Development.

[10] The Law on Joint-Stock Companies, Law on Securities Market, and Law on Accounting and Financial Reporting.

(2008) reports that larger boards are associated with smaller variability of earnings, suggesting that reaching consensus is more difficult within large boards, and that firms prefer to limit their activities to less risky projects. Staikouras, Staikouras, and Agoraki (2007) show that larger boards harm the performance of European banks; a similar result obtains for nonfinancial European and North American firms by de Andres, Azofra, & Lopez (2005). Eisenberg, Sundgren, and Wells (1998) provide evidence of the deteriorated performance of small firms with larger boards. Bennedsen, Kongsted, and Nielsen (2008) show a small adverse effect of too large boards on the performance of small and medium-size firms. Elsayed (2011) explores the effect of board size on performance in conjunction with CEO duality and shows that larger boards have a positive impact on profitability when observed together with CEO non-duality.

This research explores the relationship between board size and performance of insurance firms in Kazakhstan. We first test the relationship for the sample of monthly observations of firms and then investigate whether the role of BoDs is different during periods of negative profits. That boards of directors exceed in size the regulatory requirement of three members suggests that firms employ the resources of their directors in line with resource dependence theory.

This study conjectures that "board capital" likely becomes incredibly valuable for firms during the challenging periods of negative income. Negative profit periods associate with a decline in quality of management decisions, liquidity problems, and additional financial costs. We therefore reckon that the influence of board characteristics on firm profitability might be different in firms with negative profits. The hypothesis is:

H1. Board size relates positively to firm performance during periods of negative profits.

3.2. Regulatory Compliance and the Role of Independent Directors in Firm Performance

The second issue addressed in the current study is the impact of independent directors on firm performance. Duchin, Matsusaka, and Ozbas (2010) summarize academic views of the role of outside directors. The presence of outside directors aims at solving the information asymmetry problem faced by minority owners; it is supposed to decrease the power of insiders and control shareholders. Many countries require independent directors on boards by law; the Sarbanes-Oxley Act (2002) and the guidance of the World Bank on corporate governance imply that outside directors improve monitoring of firm performance in the interests of all groups of shareholders.

Proponents of resource dependence theory argue that independent directors bring in so-called "board capital" to firms in the form of expertise and counsel (Hillman & Dalziel, 2003; Jermias & Gani, 2014). The neoinstitutional perspective, summarized by DiMaggio (1998) and Richter (2005), presumes that organizations willing to achieve external legitimacy may create formal symbolic structures to signal their alignment to the regulatory requirements and normative expectations of external audiences and to secure the support of key outside institutions. MacLean and Behnam (2010) point out that the conflict between external and internal legitimacy of the regulatory requirements may preclude the efficient functioning of structures created by these requirements. Some organizations "decouple their compliance programs from their core business activities, deploying formal structures while avoiding integration of crucial elements of the compliance programs into the day-to-day, central, task-related processes of the organizations" (MacLean & Behnam, 2010, p. 1499).

According to the skeptical *window-dressing* view presented by Romano (2005), chief executive officers expose their power to assign directors who would be considered independent from the legal point of view but would suffer from various threats to independence. For example, when CEOs employ their friends as independent directors, the independence and objectivity of such directors suffer from over-familiarity. In the *entrenchment* view, managers dislike independent directors and attempt to avoid them. Independent directors can bring their expertise to firms, but managers would make it difficult for them to obtain full information on their firms' operations. The *optimization* view calls for an optimum number of independent directors in boards that ensures a positive impact on firm performance. Several studies question the ability of outside directors to monitor efficiently. Some of them report an absence of any significant relationship

between the number of independent directors and firm performance (e.g., Duchin, Matsusaka, & Ozbas, 2010) or provide evidence of the positive role of outside directors on firm performance when the cost of acquiring information on a firm is low: In a high-information-asymmetry environment, the efficiency of outside directors attenuates.

This paper claims that the new institutional logic is capable of explaining the reality in Kazakhstan for several reasons. First, the degree of information asymmetry is expected to be high in Kazakhstan, even in the heavily regulated environment of insurance companies. Following Duchin, Matsusaka, and Ozbas (2010), it is suggested that independent directors do not have access to insider information. Second, Minbaeva & Muratbekova-Touron (2013) report *clanism* in human resource practices in Kazakhstan, and it is assumed that hiring independent directors is subject to similar problems. Third, the formality of the process of corporate governance reforms in Kazakhstan most likely undermines the potential benefits from those reforms. All these factors suggest that the institution of independent directors has limited efficiency, and the percentage of independent directors on boards might have no connection to firm profitability. As a result, the second null hypothesis is as follows:

H2: The percentage of independent directors on a board of directors is not related to the profitability of insurance firms in Kazakhstan.

The present research is limited to two widely used BoD characteristics, board size and percentage of independent directors. Although numerous studies report a positive effect of BoDs gender diversity on firm performance (Adams & Ferreira, 2009; Campbell & Mínguez-Vera, 2008; Gallego-Álvarez, García-Sánchez, & Rodríguez-Dominguez, 2010), we do not include this variable in the analysis. Since the level of development of the governance system in the insurance sector is relatively low, and since the number of companies is small, dividing the observations in terms of gender representation on the boards might bias estimations.[11]

4. Methodology

4.1. Sample Description

The monthly financial data of 43 insurance companies are available on the site of the National Bank of Kazakhstan, www.nationalbank.kz, for the period between 2012 and 2018. The National Bank requires the insurers to submit financial reports monthly, not later than the fifth day of the month following the reported period. To a certain degree, such strict control by the regulator limits the ability of insurance companies to manipulate the reporting, thus increasing the reliability of the financial data. This fact justifies our choice of performance measures towards the accounting data instead of stock market data. In our opinion, stock market data as performance measurements are inferior to accounting data in Kazakhstan due to the undeveloped illiquid securities market. Furthermore, using accounting data allows us to include as many firms in the sample as possible.

The current study uses monthly data to capture the influence of the intra-year changes in BoDs that were frequent over the period under consideration. Of 43 firms in the initial sample with 2,776 observations, the firms that ceased to exist over the period under consideration and those that started their operations in less than five years as of 2018 are dropped. This procedure reduces the sample to 29 firms. Besides, the subsidiaries of the two largest banks that were liquidated by 2018, Kazkommertsbank and BankTuranAlem, are excluded from the sample, since these subsidiaries' performance is most likely affected by the closure of their parent banks.

The data on BoD characteristics are hand-collected from the documents published by the firms in multiple sources. Nine firms listed on the Kazakhstan Stock Exchange (KASE) publish their securities issue prospectus and related documents that disclose changes in their BoDs

[11] A model with the inclusion of the percentage of female directors in boards has been tested but not reported here since the results are not statistically significant and for the reason described above.

composition. KASE is the most convenient source for data collection; the documents contain both the beginning and the end of a director's assignments in a firm and the sequence of replacing directors. BoD characteristics of the remaining firms are taken from the data in the Financial Reports Depository of the Ministry of Finance of the Republic of Kazakhstan. These data in most cases are as complete as those published on the KASE site, although data collection from this source consumes more time. The observations of the companies that do not publish the relevant information about their BoDs, or the companies whose documents lack transparency in terms of the names of BoD members and their periods of services, are excluded from the sample prior to the first month with reliable data. The observations that lack data on BoDs composition are excluded. As a result, the final sample contains 1,708 firm-month observations.

Table 1
List of Firms in the Sample and the Number of Observations per Year

Firm name	2012	2013	2014	2015	2016	2017	2018	Total
Insurance Company "Jysan Garant"	12	12	12	12	12	12	11	83
Insurance Company "London-Almaty",	12	12	12	12	12	12	11	83
"IC "Alliance-Policy"	12	12	12	10	12	12	11	81
"IC "Centras Insurance"	11	12	12	12	12	12	11	82
"IC "Eurasia"	11	12	11	11	12	12	11	80
"IC "Kazakhmys"	12	11	12	12	12	12	11	82
"IC "Standard"	11	12	12	12	12	12	11	82
"IC "TransOil"	12	12	12	12	12	12	11	83
"IC "Victory"	12	12	12	12	12	12	11	83
"IC Amanat insurance"	12	12	12	12	12	12	11	83
"Kommesk-Omir"	12	12	12	12	12	12	11	83
"LIC "Standard Life"	12	12	12	12	12	12	11	83
"LIC State annuity company"	12	12	12	12	12	12	11	83
"Oil insurance company"	12	12	12	12	12	12	8	80
"Sinoasia B&R Insurance"		10	12	12	12	12	11	69
IC "Nomad Insurance"	12	12	12	12	12	12	11	83
"Company on life insurance "NOMAD LIFE"	4	12	12	12	12	12	11	75
Kaspi Insurance	12	12	12	12	12	12	11	83
"KazExportGarant	12	12	12	11	11	12	11	81
"Halyk -Life"	12	12	12	12	12	12	11	83
"Halyk" Insurance Company	12	12	12	12	12	12	11	83
Total observations	229	249	251	248	251	252	228	1708

Note: Firms that changed their names as a result of rebranding or following the change of shareholders, but are listed as different companies in the National Bank statistics, are considered as one company.

Overall, the final sample is representative: If the subsidiaries of Kazakommertsbank and BankTuranAlem are excluded from the calculations for the reasons explained above, the total assets of the firms in the sample comprise 72% in December 2012 and 95% by the end of 2018. Firms that changed their names as a result of rebranding or following the change of shareholders, but are listed as different companies in the National Bank statistics, are considered as one company. For example, JSC insurance company "Jysan Garant″ changed its name from JSC subsidiary "Tsesnabank" to JSC insurance company "Tsesna Garant″ after its parent bank, JSC Tsesna Bank, changed its name to JSC Jysan Bank in 2018. Table 1 presents a list of companies with the number of observations per year.

4.2. Variables Description

This study incorporates two widely used ratios of profitability, return on assets (*ROA*) and return on equity (*ROE*), as dependent variables, similar to the studies of Erhardt, Werbel, & Shrader (2003), Staikouras, Staikouras, & Agoraki (2007), Bennedsen, Kongsted, & Nielsen (2008), Mak & Kusnadi (2005), among others. Both ratios are book value estimates with net income measured for the period and total assets and total equity measured as of the end of the corresponding period. The small number of insurance firms that have their securities traded on stock exchanges in Kazakhstan precludes us from incorporating market-value-based performance measurements. Furthermore, the low liquidity of the securities market in this country makes the market-value-based analysis meaningless.

Following the studies of Cheng (2008), and de Andres, Azofra, & Lopez (2005), the total number of directors on the boards of directors represents *BoDsize*, and the percentage of independent directors in the total number of directors defines *IndepPerc*. *NegIncome* is a dummy variable equal to one if a firm has negative reported net income and zero otherwise. Inclusion of the interaction variable *NegNIBoD,* defined as *NegIncome* x *BodSize*, allows us to test the first hypothesis and explores the possible difference in the role of boards during the loss periods. Since it may be suggested that the impact of independent directors is more salient during negative profit periods, we also control for the interaction variable *NegNIIndep,* defined as *NegIncome* x *IndepPerc.*

Firm size and leverage have been recognized as important determinants of firm performance since the publication of Fama & French (1992). We measure firm size (*size*) as the natural logarithm of total assets. Leverage (*lev*) is the ratio of the book value of total debt to total assets and is controlled since it also affects firm profitability. We separate the short-term and long-term leverage effects by using a 12-period lag of leverage to control for the long-term impact on firm profitability. Furthermore, since firms' profitability in a given period is likely to affect profitability in following periods, we consider the autoregressive nature of profitability in the dynamic model, using one- and two-period lags of ROA and ROE as independent variables.

5. Results

5.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the sample. The average total assets of the firms are KZT 27.4 million with a high degree of skewness to the right; we address this problem of skewness by taking the natural logarithm of total assets. Average leverage, measured as the ratio of total debt to total assets, is 54.5%, with a minimum of 3.9% and a maximum of 94.3%. The average return on assets (ROA) is 0.6%, and the mean ROE is 1.2%, with standard deviations of 2.7% and 8.0%. The number of female directors on the boards of directors varies from zero to three, and the average percentage of female directors is 26.3%. The maximum number of independent directors is three, and the average is 1.36. Although the law requires insurance companies to have at least 30% of directors as independent, short periods with zero independent directors are possible when regulatory approvals of independent directors are pending.

Table 3 represents pair-wise Pearson and Spearman correlation coefficients. The table reports low but statistically significant correlations between most variables. Two profitability ratios, ROA and ROE, are highly and positively correlated, as expected. Board size is negatively correlated with both profitability ratios and with leverage but is positively correlated with the number of female directors, suggesting that firms with higher levels of profitability have larger boards and that female director are associated with larger boards. The percentage of independent directors has negative correlations with size, profitability ratios, leverage, and the number of

female directors, suggesting that firms with a higher percentage of independent directors on their boards are smaller, less profitable, and have lower leverage.

5.2. Test of the Hypotheses

This study tests the relationship between profitability measures of insurance firms and two characteristics of their boards of directors, the board size and the percentage of independent directors in the boards, with separating firm-month observations with negative income using the interaction variables described above. The model is as follows:

$$Perform_{it} = \beta_{0it} + \beta_2 l.Perform_{it} + \beta_3 l2.Perform_{it} + \beta_4 BoDsize_{it} + \\ + \beta_5 IndepPerc_{it} + \beta_6 NegNI_{it} + \beta_7 NegNIBoD_{it} + \beta_8 NegNIIndep_{it} + \beta_9 size_{it} + \\ + \beta_{10} lev_{it} + \beta_{11} l12.lev_{it} + \varepsilon_{it}, \quad (1)$$

where *Perform* is one of the two performance measures, return on assets (ROA) or return on equity (ROE). *l* denotes a lagged variable, and the number that follows *l* shows the number of periods for which the variables are lagged; *l* followed by no number denotes a one-period lag. Dynamic panel-data analysis without and with firm and period fixed effects is conducted. The results of the models testing Hypotheses 1 and 2 are in Table 4.

Table 2
Descriptive Statistics of the Sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Total assets	1708	2.74*10^07	3.64*10^7	1035309	2.50*10^8
ROA	1708	0.0059	0.0271	-0.1778	0.2185
ROE	1708	0.0124	0.0802	-0.8760	0.5256
leverage	1708	0.5475	0.2230	0.0388	0.9426
size	1708	16.5607	1.0557	13.8502	19.3373
BoD size	1708	3.7078	1.0175	3	8
Number of female directors	1708	0.9830	0.9969	0	3
Number of male directors	1708	2.7248	1.1997	1	7
Number of independent directors	1708	1.3554	0.5515	1	3
Percentage of independent directors	1708	0.3616	0.0884	0.2	0.75

Table 3

Pair-wise Pearson (Lower-left of the Table) and Spearman (Upper-right) Correlation Coefficients. P-values are in Parentheses

	ROA	**ROE**	**lev**	**size**	**BoDsize**	**IndepPerc**
ROA	1.000 (0.000)	0.964 (0.000)	- 0.121 (0.000)	0.139 (0.000)	- 0.034 (0.158)	- 0.045 (0.061)
ROE	0.861 (0.000)	1.000 (0.000)	0.030 (0.222)	0.147 (0.000)	- 0.052 (0.032)	- 0.047 (0.053)
Lev	- 0.093 (0.000)	- 0.017 (0.484)	1.000 (0.000)	0.097 (0.000)	- 0.160 (0.000)	- 0.085 (0.000)
Size	0.057 (0.020)	0.069 (0.004)	0.042 (0.083)	1.000 (0.000)	0.114 (0.000)	- 0.195 (0.000)
BoDsize	- 0.013 (0.583)	- 0.012 (0.630)	- 0.181 (0.000)	0.042 (0.083)	1.000 (0.000)	0.331 (0.000)
IndepPerc	- 0.069 (0.004)	- 0.050 (0.039)	- 0.063 (0.009)	- 0.154 (0.000)	0.162 (0.000)	1.000 (0.000)

Note: figures in parentheses are p-values.

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Hermalin and Weisbach (2001) point out that the models connecting performance and board characteristics are subject to endogeneity problems. One commonly used method to address endogeneity is the generalized method of moments (GMM) using dynamic panel data, as proposed by Arellano and Bond (1991). Arellano and Bond also suggest using GMM for short panel data, i.e., for the data with many firms and the observations over relatively few periods. On the contrary, the data in the current research is a long panel: the sample contains 21 firms with more than 80 observations for each firm. Following the recommendation of Labra and Torrecillas (2018), the current study applies system GMM, with lags restricted to six periods with a maximum of two lags. An alternative method for the treatment of long panel data is using the mean group estimations proposed by Pesaran (2006). However, this method is applicable for stable panel data and is not recommended for dynamic data that are "not consistent in dynamic models" (Labra & Torrecillas, 2018, p. 38). Table 4 contains the results of the analysis using GMM.

Although the sample used in the current study is representative of the insurance industry in Kazakhstan, the small number of firms may raise the question of the overall applicability of the parametric analysis. This problem is addressed in a repeated analysis with ranked variables. Each firm-month observation is assigned a rank obtained by sorting the key variables (*ROE, ROA, leverage, and size*) in ascending order to determine the initial rank. Then the final rank is calculated with the formula:

$$rank = (initial\ rank\text{-}0.5)/number\ of\ observations \quad (2)$$

The findings are in line with the main analysis; they are not reported for the sake of brevity and are available upon request.

According to the results, BoDs' size has a significant negative impact on profitability measures in the models without firm fixed effects. In other words, larger boards associate with lower firm performance. The fact that the relationship becomes insignificant when controlling for firm-specific factors can be explained by the low variability of board size observations for each particular firm. The findings are in line with the previous literature (e.g., Staikouras, Staikouras, & Agoraki, 2007; de Andres, Azofra, & Lopez, 2005; Bennedsen, Kongsted, & Nielsen, 2008). The obtained results support the first hypothesis, stating that the relation of board size to ROA changes its sign to positive when taking firm-month observations with negative profits, with 10% significance. This result indicates that boards are more active monitors in bad times. A similar change of the sign is observed with ROE, although this association is not significant in the regression with the firm- and month- fixed effects and in GMM analysis.

The percentage of independent directors on the boards is not significantly related to profitability in all models, in line with our second hypothesis. This finding contradicts the premise of the monitoring role of independent directors and reflects the formality of the appointments of

independent directors in Kazakhstan. Most likely, independent directors do not have access to insider information, and they are employed only to ensure compliance with the regulations, thereby supporting the new institutional theory. The data illustrate that the external regulations may result in the decoupling of the structures created from business activities to comply with those regulations, thereby precluding the newly created structures in organizations from efficient functioning. Moreover, as suggested by MacLean and Behnam (2010), such decoupling may result in misconduct when the independent directors are not held liable for firm performance.

As for the rest of the explanatory variables, ROA is not significantly related to a one-period lag of ROA, but it is positively associated with the two-period lags in all models. Size is not significant in most models, in line with the contradictory findings in the literature. There is a negative relationship between the current levels of leverage and firm profitability, which is significant at 5% significance for ROA, but not as straightforward for ROE. Long-term leverage, measured as a 12-month lag of debt-to-total assets, positively impacts ROA and ROE, suggesting the firms' ability to employ the attracted financing in their operations efficiently. Size is not significantly related to performance measurements.

Table 4
Results of the Analysis

Panel A. Dependent variable ROA				
	OLS			**GMM**
ROA L1.	0.0433 (1.27)	0.0135 (0.61)	-0.0256 (-1.14)	0.0433 (1.61)
ROA L2.	0.0964*** (3.4)	0.0953*** (4.29)	0.0585*** (2.62)	0.0964*** (3.97)
Size	-0.0009* (-1.77)	-0.0004 (-1.03)	0.0004 (0.26)	-0.0009 (-1.62)
Lev	-0.0235** (-2.58)	-0.0166 *** (-3.27)	-0.0199*** (-3.19)	-0.0235** (-2.55)
L12. Lev	0.0222** (2.44)	0.0142 *** (2.77)	0.0133 (2.18)	0.0222** (2.63)
Bodsize	-0.0023*** (-3.71)	-0.0020 *** (-3.53)	-0.0001 (-0.1)	-0.0023* (-2.09)
IndepPerc	-0.0011 (-0.12)	-0.0037 (-0.55)	-0.0043 (-0.52)	-0.0011 (-0.12)
NegNI	-0.0354*** (-6.21)	-0.0272*** (-5.46)	-0.0197*** (-3.87)	-0.0354*** (-4.25)
NegNIIndep	-0.0179 (-1.22)	-0.0241** (-2.27)	-0.0350*** (-3.19)	-0.0179 (-1.29)
NegNIBoD	0.0031*** (2.9)	0.0027*** (2.81)	0.0017* (1.77)	0.0031* (1.77)
Constant	0.0398*** (4.22)	0.0295*** (3.46)	0.0068 (0.28)	0.0398*** (4.58)
Fixed effects R^2 (adj) F	no 0.4059 94.92***	Time 0.5538 23.28***	firm, time 0.5724 20.22***	 40.02***
Panel B. Dependent variable ROE				
	OLS			**GMM**
ROE L1.	-0.0323 (-0.97)	-0.0657*** (-2.97)	-0.0904*** (-4.06)	-0.0323 (-1.32)
ROE L2.	0.0780*** (2.93)	0.0745*** (3.4)	0.0495** (2.24)	0.0780*** (3.25)
Size	-0.0026** (-2.14)	-0.0016 (-1.25)	0.0074 (1.57)	-0.0026* (-1.78)
Lev	-0.0398** (-2.09)	-0.0248* (-1.68)	-0.0257 (-1.4)	-0.0398** (-2.35)
L12. Lev	0.0584*** (2.97)	0.0421*** (2.79)	0.0441** (2.43)	0.0584*** (3.66)
Bodsize	-0.0053*** (-3.35)	-0.0047*** (-2.81)	-0.0022 (-0.79)	-0.0053 (-1.46)
IndepPerc	-0.0070 (-0.35)	-0.0144 (-0.71)	-0.0005 (-0.02)	-0.0070 (-0.3)
NegNI	-0.1062*** (-6.15)	-0.0900*** (-6.11)	-0.0705*** (-4.65)	-0.1062** (-2.68)
NegNIIndep	-0.0217 (-0.57)	-0.0326 (-1.04)	-0.0644** (-1.97)	-0.0217 (-0.51)
NegNIBoD	0.0075** (2.08)	0.0071** (2.48)	0.0048 (1.65)	0.0075 (0.86)
Constant	0.0946*** (4.15)	0.0738*** (2.92)	-0.0991 (-1.38)	0.0946*** (3.49)
Fixed effects R^2 (adj) F	no 0.3958 81.23***	Time 0.4906 18.29***	firm, time 0.5039 15.59***	 68.43***

Note: This table shows the results of pooled OLS regressions that analyze the relation between profitability measures, ROA and ROE, and selected board of directors characteristics. The sample period is from 2012 to 2018. Use robust standard errors clustered at the firm level. The t-statistics are in parentheses. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively (two-tailed test).

6. Discussion

This study sheds further light on the relation between BoD size and firm performance. Previous literature provided mixed results on this issue. Staikouras, Staikouras, and Agoraki (2007) report a negative relationship between the BoDs size and profitability measures in European financial institutions; de Andres, Azofra, and Lopez (2005) report similar results in their sample of firms from OECD countries. Bennedsen, Kongsted, and Nielsen (2008) also report the inverse relation in small and medium-sized firms. The findings from emerging markets are also mixed. The negative association is reported in firms in Singapore and Malaysia (Mak & Kusnadi, 2005). A negligent relation is shown in Turkish firms (Topak, 2011), Jordanian firms (Alabdullah, Nor, Ahmed, & Yahya, 2018), and Saudi Arabian firms (Ghabayen, 2012). In contrast, Kalsie and Shrivastav (2016), Mohapatra (2017) report a positive effect of BoD size on market performance measures in Indian firms. Coles, Daniel, and Naveen (2008) point to the nonlinear relation between board size and Tobin's Q; Berezinets, Ilina, and Cherkasskaya (2017) find a similar nonlinear relation for Russian public companies. Such mixed evidence from different markets may be explained by the prevalence of one of the following two effects. The lack of coordination when the number of board members is above its optimum explains the inverse relationship between BoD size and performance. On the contrary, the "board capital" view (Hillman & Dalziel, 2003) reckons that BoD members provide their expertise, networks, knowledge of the market, and experience to help firms achieve superior performance, in line with resource dependence theory (Pfeffer & Salancik, 1978, 2003).

The data of the current study provide evidence of the inverse relationship between BoD size and accounting profitability measures (ROE and ROA) in insurance firms in Kazakhstan, suggesting the lack of coordination in firms with large BoDs. This research hypothesizes that the inverse relationship between BoD size and performance changes its sign from negative to positive when firm-month observations with negative profits are considered. In line with the "board capital" hypothesis (Hillman & Dalziel, 2003), the findings suggest that higher levels of organizations get involved in firms' management during hard times. Board capital becomes relatively more important when firms face hardships during loss-generating periods. The obtained evidence is also in line with the conclusions of Coles, Daniel, and Naveen (2008) that BoD impact on performance is more salient for firms prone to greater uncertainty.

This paper does not find empirical evidence on the association between the percentage of independent directors and firm performance. The notion of including outside directors in BoDs roots in the belief that independent directors are less prone to suffer from the firms' managerial pressure (Hermalin & Weisbach, 2003) and, in line with agency theory (Jensen & Meckling, 1976), monitor the firms' managers. Bhagat & Black (2002) question the relationship between the number of independent directors and a positive impact on firm performance. However, they do not exclude the possibility of an optimum number of outside directors in BoDs. The findings of the current study are in correspondence with evidence from 47 countries (Terjesen, Couto, & Francisco, 2016), Bangladesh (Rashid, De Zoysa, Lodh, & Rudkin, 2010), China (Peng, 2004), and India (Kumar & Singh, 2012), which find no significant evidence that independent directors contribute to profitability. Nevertheless, the absence of concordance on the contribution of independent directors to firm performance should be noted. For example, the evidence from Taiwan (Kao, Hodgkinson, & Jaafar, 2019) suggests a positive contribution of outside directors to firm performance. On the other hand, the study of Vietnamese firms (Nguyen, Evans, & Lu, 2017), and of Indian firms Mishra (2020) reveal a negative impact of independent directors on firms' operating performance.

The literature provides various explanations of the negligible impact of outside directors on firm performance. Many papers explore the characteristics of independent directors in the studies of their effect on company performance. Among them are age and tenure (Reguera-Alvarado & Bravo, 2017), hierarchical position of directors, quality of the resources (Peng (2004) brought in by outside directors in China (Zhu, Ye, Tucker, & Chan, 2016), and directors'

involvement in multiple boards (Sarkar & Sarkar, 2009). Fernandez-Gago, Cabeza-Garcia, and Nieto (2016) emphasize the mediating role of corporate social responsibility in the relation between the independence of the BoD and firm value, suggesting that the firm's attitude towards the community is essential. Arosa, Ituralde, and Maseda (2010) argue that the importance of the advisory role of independent directors in Spanish family-owned firms attenuates as firms' organizational knowledge develops over the generations.

Concerning the requirement of independent directors, the mass media suggest that the choice of reform measures is vital for determining the performance of the new structures. The formalized approach of a regulator in Kazakhstan, similar to the one described by Berezinets, Ilina, and Cherkasskaya (2017) in Russia, substitutes a simplified image of concordance to international best practices for the real institution of independent directors.

The present research makes several contributions. First, the findings have important implications for regulators, practitioners, and stakeholders in the insurance industry. The results indicate that BoDs play an essential role, especially during the difficult periods of losses, suggesting more active and efficient involvement of higher-level management during those periods. However, the small impact of independent directors on firm performance suggests the underuse of the outside directors' resources in the insurance sector of Kazakhstan. Therefore, this study adds to the literature on board capital (Hillman & Dalziel, 2003) in the domain of resource dependency theory (Pfeffer & Salancik, 1978, 2003).

Furthermore, the paper draws attention to consequences of decoupling compliance procedures from the core business, described in MacLean and Behnam (2010), in the domain of the new institutional approach (DiMaggio, 1998). The paper suggests that regulators and investors should put more effort into developing such institutions as independent directors, instead of just imposing the formal requirements.

The findings inevitably have limitations related to the sample of the study, which is confined to the insurance sector in Kazakhstan. This sector is still developing, and its small number of firms makes it difficult to apply statistical analysis. This issue is addressed by using monthly data to have the largest possible number of observations and by using the generalized method of moments suggested by Arellano and Bond (1991) to deal with endogeneity. Despite its limitations, the research pertains to other financial institutions, industries, and emerging markets.

7. Conclusions

The present study illustrates how the new institutional theory explains the relation between selected BoD characteristics and firm profitability in the insurance sector of Kazakhstan. The study uses monthly data on firm performance and focuses on such characteristics as BoD size and the proportion of independent directors in the BoDs. The analysis suggests that although larger BoDs are associated with inferior performance, BoD size relates positively to profitability during negative income periods, in line with the "board capital" view. The analysis of the role of independent directors reveals that independent directors do not affect firm performance. The data support the new institutional theory that the efficiency of the external regulations may plunge since organizations include independent directors in the BoDs with the sole purpose of compliance with regulations but do not facilitate their work as monitors.

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8. Summary

English: This study explores the relationship between the selected characteristics of boards of directors composition and the profitability of insurance companies in Kazakhstan. The results provide evidence that larger boards are associated with improved profitability during the periods of negative profits, suggesting involvement of higher levels of management during hard times. The paper also discusses the importance of implementation measures when introducing new regulations based on the best international practices. Firms decouple the regulatory compliance from their business processes, in accordance with new institutional theory.

Russian: Данная статья исследует связь между отдельными характеристиками состава совета директоров и прибыльностью страховых компаний в Казахстане. Полученные результаты предоставляют свидетельство того, что больший размер совета директоров ассоциируется с улучшением показателей прибыльности в убыточные периоды. Статья инициирует дискуссию о важности методов внедрения новых регуляторных требований, основанных на международном опыте. Компании формально подходят к выполнению нормативных требований корпоративного управления и разделяют деятельность, связанную с комплаенсом от реальных бизнес процессов, согласно неоинституциональной теории.

Kazakh: Бұл мақалада директорлар кеңесінің жеке мінездемесі мен Қазақстандағы сақтандыру компанияларының өнімділігінің арасындағы байланыс қарастырылған. Алынған мәлімет бойынша директорлар кеңесінің көлемділігі табыстың төмен кезінде компаниялардың тиімділігіне әсер ететіні дәлелденген. Осындай кезде компания басқармасының жоғары кеңесінің кірісуі қажет. Бұл мақала халықаралық тәжірибе негізінде реттеу іс-шараларын жүргізу керектігі туралы пікірсайысқа шақырады. Корпоративтік басқармасының нормалық тілегіне немқұрайлы sқарайды да неоинституционалдық теориясына сәйкес компания басқармасына жол бермейді.

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Challenges for the Implementation of International Law in Central Asia: Contributing Factors and Possible Solutions

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Abstract: The current challenges and difficulties faced by international law are rather serious. Just to name some: the flagrant multiple violations of law committed by the terrorist non-state actors; ongoing armed conflicts of a mixed nature; and serious problems experienced by global or regional legal systems. The Central Asian states, i.e., Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, are not immune from those challenges, taking into account these countries' increasingly gaining in significance as international players including in the sphere of business. Issues like unresolved border disputes, drug trafficking and trafficking in humans, disputes over water, and the rise of terrorism are only a few challenges, which require the cooperation of Central Asian states among themselves.

This paper tackles several concrete problems impeding a proper and efficient implementation of international law in the region. It briefly looks at causes and influencing factors behind such challenges as the rise of extremism and terrorism, difficulties in implementing crimes under international law at the domestic level, insufficient quality of higher education (teaching) in international law, and nearly dormant constitutional justice. The paper offers potentially useful and realistic solutions to those problematic issues, taking into account the unique context and particulars pertinent to Central Asia.

JEL Classifications: K33, K38

Keywords: International Law, Central Asia, Implementation, Legal Systems, International Crimes, Criminal Law, Constitutional Law, Investment Attractiveness

1. Introduction and Purposes

Central Asia, which consists of five states, i.e., Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, represents a vast and diverse region, with distinct cultures, heterogeneous societies, and unique state and legal systems. While connected by common historical as well as cultural roots and elements, the five countries constituting the region have developed, over time, their own complex political and economic systems and social infrastructures. That became apparent after 1991 and 1992, when all these states gained their independence from the Soviet Union and started truly evolving their own statehood. Each state of the region has its own distinct features in terms of population, territory, demographic situation, form of government (with Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan being presidential republics and Kyrgyzstan representing a parliamentary republic), and political influence. While the legal systems of all five states operate based on traditions of continental civil law, for the last 30 years those systems have developed their own distinguishing characteristics, from the point of view of both doctrine and practice.

As members of the international community and full-fledged subjects of international law, Central Asian states are not immune from international challenges. This is especially true given that

these five states are becoming more significant in terms of geopolitical influence and international law at an ever-increasing rate (Sanghera & Satybaldieva, 2018; United States Bureau of South and Central Asian Affairs, 2020). The same is true with respect to the attractiveness of Central Asian markets for foreign investors. This demands that the states in question closely cooperate with each other but also with other states, and do that relying on international law both as an instrument for the protection of peace and stability in the region and for promoting their own lawful interests including but not limited to business and creation of investment opportunities. For a region where individual states have experienced wars (non-international armed conflict in Tajikistan) and situations of violence (Kyrgyzstan, Uzbekistan), that becomes an imperative task, indeed.

The main purpose of this paper is to look at some of the abovementioned challenges, which include (1) international terrorism, (2) domestic implementation of international crimes, (3) quality of education in the sphere of international law and the latter's doctrinal development in the region, and (4) lack of practice on international law related issues from the constitutional legal point of view. Several contributing causes and factors affecting these problems are briefly considered, followed by potentially useful but (one hopes) realistic solutions and recommendations. It appears to be all the more so important, or called for, given that international law is still not so well-known to the general or professional audiences here in the region or may be perceived as a politicized phenomenon (for example, by lawyers from the positivistic camp who might even view it as not really a "law" in the strict sense of the word). This is despite the fact that all Central Asian states have recognized international law in their respective constitutions as a source of law, albeit to differing extents, while it may safely be stated now that international law doctrines in Central Asia are slowly and gradually developing, as discussed below.

2. Methodology

The methods applied in writing this paper include a comparative (sub) interdisciplinary legal method, as it analyzes concepts from international law, criminal law, and constitutional law. The paper also employs non-legal perspectives when looking at causes contributing to the challenges of international law in the region, for example, political, social, and economic factors. Furthermore, to arrive at key conclusions and recommendations, the paper uses a contextual approach when dealing with particularities or unique features of each country context considered; it helps in making sure that the paper analysis remains concrete, relevant as well as realistic, and not abstract. Finally, the terminology is mostly composed of legal or academic lexicon depending on the nature of the problem (e.g., constitutional legal language when looking at issues of constitutional justice and control).

3. Research Results and Discussion

3.1 International Terrorism

Terrorism and extremism still threaten international peace and security. They affect many United Nations member states, with their populations and socioeconomic development bearing the ultimate negative humanitarian costs. Central Asia is, unfortunately, not an exception. Since 2001, the majority of the region's countries have been hit by terrorist activities, including Kazakhstan (bombings and armed attacks in 2004, 2011, 2012, and 2016), Kyrgyzstan (killings, hijackings, and other types of attacks in 2002, 2003, 2006, 2015, and 2016), Tajikistan (killings and explosions in 2001, 2007, 2009, 2010, 2012, 2014, 2015, and 2018), and Uzbekistan (bombings and armed attacks in 2004 and 2009)

(Lemon, 2018). All but Turkmenistan have been affected by terrorist acts[1] which entailed human losses including among civilians and which destroyed property.

However, over the last few years, Central Asian governments have become increasingly concerned, and rightly so, about the growing foothold of certain non-state armed actors such as the notorious Islamic State, or Daesh (which split from al-Qaeda in 2013), in neighboring Afghanistan and Pakistan, as well as the resurgence of the Taliban and other militant groups in northern Afghan provinces bordering Central Asia (Tajikistan, Uzbekistan, and Turkmenistan) (Soliev, 2016). This concern appears to be justified: Just four years ago, approximately 2,200 Central Asians—comprising 700 Tajik, 500 Kyrgyz, 400 Kazakh, 360 Turkmen, and 200 Uzbek nationals—were believed to be fighting alongside jihadists in Syria and Iraq (Soliev, 2016).

From the international legal perspective, Central Asian states have high rates of ratification of the main instruments of international legal counter-terrorism (Tadjbakhsh, 2011). Those instruments include the universal conventions against terrorism as well as international human rights, international humanitarian, and international refugee law treaties (United Nations Office on Drugs and Crime (UNODC), 2018). Moreover, addressing the above concerns from the domestic perspective, the governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan have adopted extensive programs and legislation to combat terrorism and religious extremism; they criminalized terrorist activity and terrorism-related acts (Omelicheva, 2007). They have established counter-terrorism institutions with almost identical functions and authority; the domestic counter-terrorism legislation of all Central Asian states reiterates principles of the rule of law and of respect for human rights (Omelicheva, 2007). Recently, Kazakhstan amended its Law on Citizenship, adding a provision on deprivation of citizenship for those nationals who commit crimes of terrorism.[2] Similar legislative amendments have been introduced in Kyrgyzstan and Uzbekistan (Zhirukhina, 2019).

Strengthening anti-terrorist legislation, including criminal legislation, is a laudable effort adding to, or fortifying, the impact of international and regional legal systems. However, this might not suffice. It appears that increase in the participation of the states in question in the work of regional security organizations could also add value to fighting international terrorism in their region. No single state may be certain that it can deal with the challenge of terrorism and extremism on its own, especially given the ever-increasing processes of globalization. Maintaining international and regional peace and security can be achieved only through cooperation. That, in turn, will make it possible to earn or increase the trust of foreign investors, for example, from certain European countries, in opening and maintaining business undertakings in the region's countries.[3]

In the sphere of security, several organizational frameworks for collaboration provide such opportunities, with some states in Central Asia playing a role. They include the Shanghai Cooperation Organization (SCO), the Collective Security Treaty Organization (CSTO), and the Commonwealth of Independent States (CIS). While some (like the CSTO) may be said to be relatively young, and others have attracted criticism from the West (like the SCO) despite their efficiency in addressing terrorist issues, they provide a convenient uniting platform for Central Asian countries in terms of common spheres of interest: political, economic, legal, educational, environmental, and others. The mandates of all three include or prioritize maintaining peace and enhancing security and confidence in the region; individual members contribute to this objective.

[1] Turkmenistan does not figure in this statistical data due to lack of reliable or full information.

[2] Article 20-1 of the Law of the Republic of Kazakhstan on Citizenship states: "Deprivation of citizenship of the Republic of Kazakhstan is allowed only by a court decision for committing terrorist crimes."

[3] In the personal experience of this author, the lack of investment attractiveness of countries such as Uzbekistan has significantly impeded the development of foreign businesses in the past; business owners in Germany, for instance, used to find the idea of investing in the country's certain business sectors (such as restaurant or delivery businesses) risky or even reckless.

3.2 Domestic Implementation of International Crimes

Crimes under international law, or *core crimes*, in the contemporary understanding include genocide, crimes against humanity, war crimes, and the crime of aggression. They affect fundamental values of the international community and establish criminal responsibility directly under international law (Werle & Jessberger, 2014, p. 45). The domestic implementation and prosecution of core crimes are vital to the emerging system of international criminal justice (Werle & Jessberger, 2014, p. 144). It is hard to argue against this point. While the Rome Statute of the International Criminal Court (ICC) openly acknowledges the idea of decentralized administration of justice,[4] it does not obligate the states with respect to the incorporation of crimes under international law into their domestic law. Of the five Central Asian states, only Tajikistan has ratified the Rome Statute (International Criminal Court, 2003).

However, some states in the region have already carried out a significant amount of implementation work relating to core crimes. For example, Kazakhstan has implemented almost all core crimes, with the exception of crimes against humanity, in Chapter 4 of the Special Part of its Criminal Code. There the respective dispositions, or *corpus delicti*, of genocide, war crimes (the use of prohibited means and methods of warfare, violation of laws, and customs of war), and aggression or propaganda for war have been introduced under a traditional heading of crimes against the peace and security of mankind.[5] Despite the fact that these provisions still require elaboration and development (rephrasing some elements of war crimes for the purposes of better interpretation and accuracy, updating the definition of aggression in accordance with contemporary international criminal law), it appears that Kazakhstan did accomplish serious work in introducing individual criminal responsibility for crimes against the peace and security of mankind. However, the incorporation of crimes against humanity into the domestic criminal law of Kazakhstan is still lacking. In Uzbekistan, where the relevant criminal legislation is being transformed, with a new edition of the Criminal Code being worked out, the question of implementing core crimes at the national level has received a new impetus, thanks to the country's President calling in 2018 for a new Code, the provisions of which must better correspond to international law and which would be more suited to realities of today (Sayapin, 2020, p. 2). It has been suggested that the chapter on crimes against the peace and security of mankind in the revised edition of the Criminal Code should contain, *inter alia*, a revised definition of the crime of aggression, encompass a broader range of war crimes committed both in international and non-international armed conflicts, adjust Uzbekistan's position with respect to the principle of universal jurisdiction, and incorporate crimes against humanity in the Code's new edition (Sayapin, 2020, p. 23).

The absence of dispositions for crimes against humanity is to be noted in the law of other states of the region, too, except for the Kyrgyz Republic.[6] The work carried out in that Republic with respect to crimes against peace and security of mankind and separately grouped war crimes under the section on crimes against the international legal order in its current Criminal Code, as a result of a major criminal legal reform since 2017, is to be noted.[7] A detailed list of individual acts constituting these crimes in the Code is certainly to be praised though not all of the acts are enumerated in accordance with the Rome Statute's article 7.[8] The fact that Chapter 53 is dedicated to the dispositions and

[4] Rome Statute of the International Criminal Court, opened for signature 17 July 1998, 2187 UNTS 90 (entered into force 1 July 2002) (Rome Statute), Article 1.
[5] Articles 160-161, 163-165 and 168 of the Criminal Code of the Republic of Kazakhstan.
[6] See Chapters 52 and 53 of the Criminal Code of the Kyrgyz Republic; Chapter 34, articles 395-405 of the Criminal Code of the Republic of Tajikistan; Chapter 21, articles 167-170 of the Criminal Code of Turkmenistan.
[7] Articles 380-395 of the Criminal Code of the Kyrgyz Republic.
[8] Ibid., art. 381.

sanctions for the commission of war crimes and other violations of laws and customs of warfare (!) in a detailed manner is also worthy of mention.

The incomplete level of national implementation of crimes under international law in the region deprives its states of the possibility of efficient prosecution for those crimes. This certainly does not strengthen relevant international law and its application in the region. Hence, despite the notable work on implementation of core crimes, Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan could benefit from bringing their criminal legislation into fuller conformity with international (criminal) law.

3.3 Education and Doctrine in the Sphere of International Law

Despite the non-exhaustive list of challenges faced by international law in the region and their serious nature, it appears logical to suggest that the Central Asian states need to rely more on international law to advance their own lawful interests as well as to maintain regional—and international—peace and security (Sayapin, 2021). However, it is all the more surprising (or not) that international law is still largely unknown among Central Asian audiences (general public and even some lawyers). One reason might be the attitudes towards international law by legal specialists who could question the validity or relevance of international law. Another reason could be the level of teaching of international law in the universities.

According to Sergey Sayapin, notable international law schools in the region include: (1) Kazakhstan: the M. Narikbayev KAZGUU University, KIMEP University, the Kazakh National University (KazNU) named after Al-Farabi, and the Eurasian National University (ENU) named after L. N. Gumilev; (2) Kyrgyzstan: the Kyrgyz National University named after Zh. Balasagyn, the Kyrgyz-Russian Slavonic University, the American University of Central Asia (AUCA), the Kyrgyz State Law Academy, the International Alatoo University, and the Osh State University; (3) Tajikistan: the Tajik National University and the Russian-Tajik (Slavonic) University; (4) Turkmenistan: the Institute of International Relations of the Ministry of Foreign Affairs; and (5) Uzbekistan: the National University of Uzbekistan named after M. Ulugbek, the University of World Economy and Diplomacy, the Tashkent State University of Law, the Westminster International University, and the Karakalpak State University named after Berdakh (Sayapin, 2021).[9] All these higher educational institutions train international lawyers for public and private sectors.

The challenge of language is at issue here: Among several generations of Central Asian scholars of international law, many senior Central Asian international lawyers, in Sayapin's words, know little English (and other foreign languages), and may thus belong to a "separate epistemological community" of Russian-speaking scholars of international law who are "tied together by a common language, history, and geographical space in the former [Union of Soviet Socialist Republics]" (Sayapin, 2021). While younger generations of international lawyers are as a rule well-trained in foreign languages, first of all English, French, German, and Polish, and hence are exposed to various international law doctrines, this is not the case for the first generations. This limits the access of the latter to different Western and Eastern schools of thought on international law, which in turn reflects on the comprehensiveness of doctrinal coverage, teaching, and publication. Coupled with the fact that the number of quality translations of leading textbooks and monographs on international law or its relevant branches into Russian is limited (a rare example of such a translation would be Верле/Werle, 2011), the lack of language skills, which decreases the quality of scholarship, remains a challenge in the region.

[9] The substantive areas of international law where lawyers and scholars trained in those universities have contributed would be the following: history of international law, international legal personality and statehood, state succession, regional security, human rights law, international humanitarian law, international criminal law, international economic law, international criminal law, and international conflict and security law.

3.4 Constitutional Law and Practice

While one might sustain that the five Central Asian constitutional systems do not represent the stellar or novel examples of modern constitutionalism and may be in some sense characterized as instrumentalist for the governing orders, it should not be forgotten, for the sake of fairness, that these systems are still young, transitional, and path-dependent (Newton, 2017, p. 6). This definitely affects the processes characterizing the constitutional jurisprudence and justice in the region. Unfortunately, these processes were largely stunted here, with constitutionalism having still not been embedded in a dynamic manner in legal but also political culture across the region (Newton, 2017, p. 7). However, there have been non-systemic exceptions, as the case of Kazakhstan demonstrates.

It would be more appropriate to refer to Kazakhstan's constitutional system as a system of "flexible" constitutional control rather than true constitutional justice, due to some of its determinate elements. One of those elements would be the fact that there is no Constitutional Court, or any other equivalent high judicial body in Kazakhstan, that hears and decides on constitutional cases and disputes. Instead, a Constitutional Council was established in accordance with the 1995 Constitution. Conceived as a quasi-judicial body based on the French model, it appears to be a rather flexible instrument often used for a legal formalization of constitutional deviations, by way of adopting its normative resolutions.[10] Yet, judging by its comparatively active work over the past 20 years, it appears that it has so far managed to address and pronounce on a range of important substantive and procedural issues in the country's state and legal systems. It could even be tentatively dubbed as a "relative success" in terms of constitutional practice compared to other Central Asian counterparts such as Uzbekistan or Tajikistan. Those issues include the following: rules obligating the criminal prosecution authorities to assist the victim in criminal cases of private prosecution; the state's constitutional duties to ensure adequate protection of the rights and freedoms of citizens, including judicial protection; the order of using the forced delivery of a person to the interrogating officer, investigator, prosecutor, or the court in case of failure to appear upon their call without good reason; the inviolability of personal dignity which obliges the state to establish legal guarantees for the protection of this intangible good, not only during a person's life, but also after death; necessity to make wider use of the possibilities for courts to address the Constitutional Council with their requests for verification of the constitutionality of acting legal acts, as well as the status of constitutional legality in general in the country over recent years (Atadjanov, 2020).

These instances illustrate concrete situations that are significant from the point of view of constitutional law; they have shown once again how important it is that the developments in the political system are checked against their constitutionality by an appropriate body of constitutional supervision and in a proper manner (Atadjanov, 2020). However, they also demonstrate that the main state mechanism, which deals primarily with constitutional law, has not reviewed any issue relevant for (public) international law and its implementation at the national level over recent years. While a number of normative resolutions since 1995 have dealt with human rights (constitutional rights) of the man and citizen and have provided certain deserving clarifications as to how to interpret properly the Constitution in this regard, no act of the Council has been issued after 2009 on any pertaining matter of international law, such as international treaties of Kazakhstan, principles and norms of international law, peaceful resolution of disputes between states, the role and place of international

[10] This is especially so considering the absence of any possibility for ordinary individuals and citizens to petition directly the Council. In accordance with Article 20 of the Constitutional Law of the Republic of Kazakhstan "On Constitutional Council" of 1995, only the following actors may initiate constitutional proceedings: President, Chairman of the Senate and Chairman of the Majilis (Lower Chamber) of the Parliament, a group of parliamentarian deputies constituting no less than one-fifth of the total number of deputies of the whole Parliament, Prime Minister, and courts (not individual judges), as well as state bodies and officials whose acts are subjected to constitutional scrutiny.

law as part of the acting law of the Republic, international obligations of the state, and so on (Конституция Республики Казахстан, 2019). Perhaps the explanation for this could be that no need presented itself or that no authorized actor (for example, the Government or courts) sought for corresponding explications and clarifications from the Constitutional Council, but the very absence of such constitutional analysis for the last decade certainly points towards the conclusion that the question of domestic realization of international legal norms and principles is currently not on the constitutional quasi-judicial agenda in the country.

4. Conclusions and Recommendations

The foregoing analysis has demonstrated that the following non-exhaustive issues exist in Central Asian states that contribute negatively to or complicate the processes of domestic implementation of international law: (1) the increasing involvement of citizens of Central Asian states in the activities of terrorist non-state actors abroad and ensuing vulnerability of the respective states to the threat of international terrorism; (2) already tangible but still insufficient implementation of crimes under international law in the national legislation, with a higher legislative integration level in Kyrgyzstan and Kazakhstan and to a lesser extent in the other three states; (3) at the scholarly level, lack of foreign language skills necessary to research and employ non-Central Asian and non-Russian schools of thought; and (4) longtime absence of discussion and review of international law-related issues in the constitutional justice discourse pointing towards lack of interest and understanding of the significance of international law implementation at the country level.

It appears logical to suggest that the recommendations that follow and that conclude this paper might be useful in addressing the main issues delineated above, in both the short-term and long-term perspectives:

Primo: Increase in the participation of the Central Asian states in the work of relevant regional security organizations such as SCO, CSTO, and CIS, and active mutual cooperation on fighting global terrorism coupled with continuing to strengthen respective domestic legal frameworks (criminal law, administrative law), with a proper regard for upholding fundamental human rights.

Secundo: Further development of the relevant domestic criminal legislation penalizing crimes under international law, or core crimes; in particular, introduction of separate *corpus delicti* (dispositions) of crimes against humanity as well as more inclusive formulations of war crimes and revised definitions of the crime of aggression into Central Asian criminal codes.

Tertio: Given the lack of access to foreign academic texts and works due to language barriers, as many of those works as possible need to be professionally translated into Russian and, to the extent feasible, into national languages in the region (Kazakh, Kyrgyz, Tajik, Turkmen, and Uzbek).

Quarto: Increasing awareness among the actors entitled to petition the Constitutional Council, but also among the members of the Council itself, of the importance of international law for the country's state and legal system and practice, and correspondingly of its implementation.

To summarize, the paper looked, in a brief and non-exhaustive manner, at selected topical issues pertaining to *la mise en oeuvre* of international law in the countries of the region, and tried to provide potentially helpful suggestions on how to address those issues. It goes without saying that the processes of domestic implementation require considerable effort, time, resources and, of course, a determined political will. That in no way implies that these processes are unrealistic or unachievable

given that all Central Asian states have recognized international law (international treaties; values, principles, and rules of international law) in their respective constitutions as a source of law. The potential is there. Moreover, it is assumed that the states in this geopolitically important region of the world are conscious of the fact that international law, together with a proper fulfillment of international legal obligations, are vital for ensuring and protecting their regional but, even more so, national interests that encompass economic and business development goals. The fundamental values of peace, security, and well-being are among those interests. This also takes into account the increasing and undeniable gains in significance of Central Asian states as international players. So long as that awareness is present, implementation will continue despite all the challenges.

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5. Summary

English: This article deals with several problems impeding the process of implementation of international law in Central Asia such as the rise of extremism and terrorism, difficulties in implementing crimes under international law at the domestic level, insufficient quality of teaching international law, and almost dormant constitutional justice. It offers potentially useful solutions to those problematic issues, taking into account the unique context of the countries of the region.

Russian: В данной статье рассматривается ряд проблем, препятствующих процессу имплементации международного права в Центральной Азии, таких как рост экстремизма и терроризма, трудности имплементации преступлений по международному праву на национальном уровне, недостаточное качество преподавания международного права и практически бездействующее конституционное правосудие. Работа предлагает потенциально полезные решения этих проблемных вопросов с учетом уникального контекста стран региона.

Kazakh: Бұл мақалада Орталық Азияда халықаралық құқықтың жүзеге асу процессіне кедергі болатын бірқатар мәселелер қарастырылады, мысалы: экстремизм мен терроризмнің өсуі, халықаралық құқыққа қарсы қылмыстарды ұлттық деңгейде жүзеге асырудағы қиындықтар, халықаралық құқықты оқыту сапасының жеткіліксіздігі және іс жүзінде әрекетсіз конституциялық сот төрелігі. Мақалада аймақтық елдердің ерекше жағдайларын ескере отырып, осы проблемалық мәселелер бойынша ықтимал пайдалы шешімдер ұсынылған.

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Reliability of Measuring Poverty Using Panel Data—Evidence from Kazakhstan

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Abstract: A panel dataset based on rotating cross-sections of Kazakhstan Household Budget Surveys for 2001-2009 have been constructed. The five matching techniques were carefully applied and tested. Three matching techniques are based on the characteristics of each individual in each household, such as birth year, birth month, gender, and first name. The other two matching techniques focused on the following characteristics of the head of household: birth year, gender, education, and ethnicity. Analysis of the properties of the matching techniques established that the most reliable matching technique was based on an individual's birth year, gender, and first name. The paper reports on the development and application of a methodological approach for testing the reliability, robustness, representativeness, and attrition of unintended panel data. The representativeness of the constructed panel has been studied and compared to the cross-section data of KHBS. Despite substantial attrition in the constructed panel data, as expected, the analysis of attrition biases based on observables indicates that poverty levels are not significantly biased by attrition. The study delivers a sound methodological approach to testing panels, capable of supporting analysis requiring longitudinal data in Kazakhstan.

JEL classifications: C81, C82, C83

Keywords: Panel Data, Attrition, Poverty, Kazakhstan, Longitudinal Surveys

1. Introduction

Static poverty measurements are not enough for broad and in-depth research of well-being issues (Foster 2007; Calvo & Dercon 2007) and therefore the poverty measures incorporating time dimensions are increasingly used. However, the lack of longitudinal surveys for developing countries makes it more difficult to study poverty dynamics. Some longitudinal surveys for developing countries have been exploited for the analysis of the measurement and determinants of chronic poverty (Jalan & Ravallion, 2000; Klasen, 2000; Jalan & Ravallion, 2002; Duclos, Araar, & Giles, 2010; Quisumbing, 2011; Dercon & Porter, 2011). However, these surveys are limited by the low number of waves in the panel. Also, pseudo-panel data, based on repeated cross-sections (Deaton, 1985), have been proposed and employed (Antman & McKenzie, 2005). Little work has been done for transition countries based on the available panel data (Lokshin & Ravallion, 2004). Reliable panel data would help to explain the dynamics of well-being of households and individuals in a longitudinal perspective.

Longitudinal surveys have not been conducted in Kazakhstan. Therefore, this study attempts to construct a long panel dataset by identifying rotating panels of Kazakhstan Household Budget Surveys (KHBS). The aim of the research is to match observations on subsequent cross-sections by five techniques that are based on unchangeable indicators of the individuals, such as birth year, gender, first name, and birth month. The reliability and robustness check of these approaches helps to identify the best matching technique. Also, the representativeness and attrition of the constructed panel are discussed.

The paper is organized as follows: Section 2 gives an overview of longitudinal surveys and the problems of attrition. Section 3 outlines the survey data availability for Kazakhstan, and it describes Kazakhstan Household Budget Surveys. Section 4 offers an overview of the construction of panel data based on different matching techniques and also analyzes reliability and robustness of the panel data constructed by various matching techniques. Section 5 tests the representativeness of the constructed panel data. Section 6 deals with attrition issues whilst Section 7 summarizes the study.

2. Background and Literature Longitudinal Surveys

2.1 The Types of Longitudinal Surveys

For an analysis of dynamic poverty measures, longitudinal data have become an essential tool over the last few decades. An analyst who considers cross-sectional data can draw conclusions based on only this time period, since cross-sectional data for household surveys consider the set of households or individuals for only one period. Pseudo-panel data based on repeated cross-sections (Deaton, 1985) have been proposed and employed by some authors (Antman & McKenzie, 2005). In this approach, the group of individuals with fixed characteristics, such as age, can be identified as a "cohort" and then followed for several years. In contrast, longitudinal surveys provide repeated observations over time on a set of variables for the set of persons belonging to the survey. Diverse approaches derived from these repeated observations on the same people, distinguish between three types of longitudinal surveys: retrospective surveys, panel surveys, and record linkages (Buck, Ermisch, & Jenkins, 1995; Lynn, 2009).

In retrospective surveys (East & Uncles, 2008), respondents are normally interviewed once and asked about the past. The positive side of this technique is that it is easy to apply and inexpensive (mainly because there is only a single interview; respondents do not have to be tracked); also, it provides instant access to longitudinal information (since one does not have to wait for a second view to measure change). On the negative side, the technique is subject to recall error and, in turn, may produce biased estimates.

In panel surveys, a sample of individuals (a *panel*) is followed over time, and data are collected from a sequence of interviews (*waves*) (Duncan & Kalton, 1987). There are several variations on this universal description, but the key characteristic is that surveys comprise either a *single panel of indefinite life* or many overlapping panels of a fixed lifespan, also known as *rotating panel* surveys (Bailar, 1975). Longitudinal surveys could be differentiated by the length between waves, by a unit of analysis (separate individual, individual in household, or household), and by information collected for analysis (Jenkins, 2011). Further systemization of a single panel of indefinite lifespan by Buck, Ermisch, and Jenkins (1995) divides it into cohort panels and household panels. The cohort panel is at the individual's level and includes a specific birth cohort of the population (or some subsample of this) (Goldstein, 1969). Household panels require a more comprehensive structure that covers representativeness at the household

and individual levels. This panel also requires following new households created by the members of an initial wave of households (a split of the household or a new household created by adult children).

A rotating panel survey includes a series of split panel surveys spread over a period of starting times (Kalton & Citro, 1995). An original sample of respondents is selected and interviewed a prearranged number of times, with regular intervals that are shorter than those in most household panels. For the period of the first panel's life, a new sample is selected, followed, and interviewed in the same way as the first. Third and subsequent panels are constructed correspondingly. Therefore respondents are constantly rotated out of the survey and replaced by those rotated into the survey. Even though each component panel has a predetermined fixed life, the overall survey typically has an indefinite life. The rotating panel has these features: First, the shorter interval between interviews relative to household panels can decrease errors about relatively high-frequency events and details of variables, such as income or consumption expenditures; second, the survey can offer better cross-section information, given the period, from the grouping data of the component panels (until the measurement periods for each of these overlap). The rise in sample size decreases sampling errors; and third, by limiting the duration of each panel to a finite period, often only a few years, problems of attrition are decreased and representativeness is more easily sustained.

In *record linkages,* longitudinal data can be collected without individual interviews, by connecting joint personal files from data sets that are independent of time (Jaro, 1995; Blakely & Salmond, 2002; Herzog, Scheuren, & Winkler, 2007; Jenkins, Lynn, Jäckle, & Sala, 2008). These data sources may be administrative records collected for government aims, e.g. income tax returns, social security benefit administration records, and surveys such as national censuses.

2.2 Attrition

The main issue with longitudinal data is attrition. Even the world's leading surveys, household panel surveys for developed countries, observe substantial rates of non-response. For example, the Michigan Panel Study of Income Dynamics, which began in 1968, had a cumulative attrition rate of 51% after 20 years (Fitzgerald, Gottschalk, & Moffit, 1998). Even with complicated design, modern surveys report high rates of attrition. The German Socioeconomic Panel, which started in 1984, and the British Household Panel Survey, which started in 1991, observed about 66% attrition of their original samples (Kroh & Spieß, 2006; Taylor, Brice, Buck, Prentice-Lane, & Freed, 2010). Watson (2003) observed five-year attrition rates of the European Community Household Panel that varied from 18% in Portugal to 43% in Ireland. Nicoletti and Peracchi (2005) focus on response and explanatory factors affecting the probability of survey response for the European Community Household Panel. They conclude that certain individual and household characteristics—the number of children, the length of residence at the current address, home ownership, and the index of non-response to a question about household income—are good predictors of future contact; whereas age, labor force status, living as a couple, and frequent contact with neighbors are good predictors of future cooperation, given contact.

Similar results arise from the analysis of attrition in longitudinal surveys in developing countries. Alderman et al. (2001), by employing panel data from Bolivia, Kenya, and South Africa, find that the attrition rate is high, but it is not a significant and pervasive problem in the consistency of estimations. Falaris (2003) reaches the same conclusions, based on longitudinal data from the Cote d'Ivoire, Peru, and Vietnam. Attrition rates might differ for longitudinal surveys that cover different types of population and employ various designs. A lot of longitudinal surveys in developing countries are constructed to

exclude from follow-up waves those respondents who moved out of the original community (Thomas et al., 2010).

It has been claimed that attrition might be more problematic in developing countries (Ashenfelter, Deaton, & Solon, 1986). The lack of information, infrastructure, and elevated mobility, in particular between rural and urban areas, make survey tracking in developing countries more difficult. However, the substantive research based on panel data for developing countries (Alderman et al. 2001; Falaris, 2003; Outes-Leon, 2008; Baulch, 2011; Bhatta & Sharma, 2011; and Dercon & Porter, 2011) contradicts this statement. Also, the much smaller refusal rates imply that, in general, wave attrition is much lower in Bangladesh, Pakistan, and Ethiopia than in developed countries. Rosenzweig (2003) illustrates that, in Bangladesh, restricting interest to stayers in models of school achievement and monthly earnings considerably overstates the impact of household income (in the first wave of the survey) and of land on mobility, while it understates the impact of the initial stage of schooling.

Researchers have done few panel studies in transition countries, such as Russia, Hungary, and Vietnam. Lokshin and Ravallion (2004) analyzed household income dynamics, based on longitudinal surveys, in two transition countries (Hungary and Russia). For Hungary they employ six waves (1992-1997) of the HHPS; for Russia, four waves (1994-1998) of the RLSMS. The attrition rate is 48% for the HHPS and 45% rate for the RLSMS.

Glewwe, Gragnaloti, and Zaman (2002) analyze the relationship between economic growth and poverty reduction, using panel data from two surveys in the 1990s for Vietnam. Although attrition exists between two waves, the authors do not consider this issue, since data in both periods were nationally representative. Baulch and Dat (2011) used Vietnam Household Living Standards Surveys for the years 2002, 2004, and 2006 to analyze attrition bias. They found a little evidence that attrition is non-random; so evaluations of determinants of chronic and transient poverty now correct for attrition bias (Baulch & Dat, 2011).

Hausman and Wise (1976, 1977, and 1979), Heckman (1976 and 1979), and Griliches, Hall, and Hausman (1978) have developed models addressing the general problem, incorporating non-random missing data into econometric analysis of panel data. Attrition is a special case. This approach suggests that attrition bias arises from the attempted selection of unobservable data. Finding an appropriate instrument for unobservable variables is unusually difficult in the case of nonresponse, since few variables affecting nonresponse are excluded from the main equation of interest on *a priori* grounds. Fitzgerald et al. (1998) propose a selection of observable variables where no exogenous instrument is available and this variable influences attrition propensities and is endogenous to the dependent variable. Baulch and Dat (2011) and Alderman et al. (2001) applied this approach to developing countries.

The strengths of longitudinal data are: analysis of unit-level change; measures of stability or instability; and the measurement of the duration of state. However, they also have weaknesses. The first is panel conditioning (Das, Toepoel, & van Soest, 2011), which arises when responses of individuals in the second wave are influenced by participation in the first wave. The next weakness is sample attrition (Fitzgerald et al., 1998; Laurie, Smith, & Scott, 1999; Alderman et al., 2001; Outes-Leon & Dercon, 2008). This weakness is attributed to the continuous loss of individuals from the sample due to non-response at each wave of the longitudinal survey. Another problem is that the time dimension produces complex tasks for the survey organization. Finally, longitudinal data have sampling errors as well as cross-section and measurement errors. However, the strengths of longitudinal data for dynamic analysis and their usefulness for policy purposes outweigh disadvantages.

3. Data

3.1 Surveys Conducted in Kazakhstan

This section describes the availability of household surveys in Kazakhstan since independence. Since 1992, several multipurpose household surveys have been conducted. In the first years of transition, multipurpose household surveys were conducted by the World Bank, such as the Kazakhstan Living Standards Measurement Survey (LSMS) in 1996, which included 7,227 individuals and 1,996 households. The multi-stage random sampling method has been used in collecting the LSMS. All 19 oblasts (regions) were covered.[22] The main aim of the LSMS was to collect individual, household, and community data to measure living standards. It also included modules on time budgeting, health conditions, and gender. In 1997 the Agency of Statistics of the Republic of Kazakhstan (ASRK)[23] conducted the Household Budget Survey with 6,000 households. Starting from 2001, ASRK has collected quarterly data for 12,000 households. Other multipurpose household surveys have been collected and include the Life in Transition Survey, conducted by the European Bank of Reconstruction and Development and the World Bank, for some countries in transition in 2006 and 2010.

Another type of household survey covers health and women's or children's problems. They include the Kazakhstan Demographic and Health Survey (KDHS), conducted by the World Health Organization (WHO) in 1995 and 1999, and the Multiple Indicator Cluster Surveys3 (MICS3) initiated by the United Nations International Children's Emergency Fund (UNICEF) in 2006 and 2010. The KDHS survey mainly provides information on health and nutrition, and the MICS3 provides information on the general situation of children and women. In addition, the World Health Organization conducted a World Health Survey in 2002 for Kazakhstan, which included 15,337 individuals and 4,499 households, with national coverage. The WHO's World Health Survey seeks to provide statistical data for the national health information system to better monitor health trends, the effectiveness of the health systems, and policy priorities in health-related parameters.

All the surveys mentioned are cross-sections or rotating cross-sections. These surveys provide only cross-section information; there are no panel data on a household- or individual-level in Kazakhstan. Neither have researchers evaluated poverty in dynamics. Brück et al. (2014) fully review survey data for Kazakhstan and research output based on these data.

3.2 Kazakhstan Household Budget Surveys

This section describes Kazakhstan HBS in detail, to see whether researchers can construct panel datasets from these surveys. Nationally representative, KHBS from 2001 to 2009 collected broad information about living standards from 12,000 households. The surveys are representative at the oblast levels, and they stratify by rural areas as well as by small, medium-sized, and large cities. The first stage samples within each oblast (except for Kazakhstan's two largest cities, Almaty and Nur-Sultan). Areas were

[22]For this period, Kazakhstan had a different administrative structure. Currently only 14 oblasts exist.
[23] Now it is the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

divided into four strata: large cities, medium-sized cities, small towns, and rural settlements. In the second stage, primary sampling units, each with at least 150 households, were taken in each stratum. Within each primary sampling unit, households were sampled with a probability proportional to household size. Thirty households are listed, with 10 additional households listed for replacements.

The questionnaires contain four modules. The first concerns daily expenditures on food and household necessities; the second includes quarterly expenditures for clothes, durables, utilities, education, healthcare, transportation, and other items. The second module also includes household incomes. The third module gathered data for housing conditions, livestock, equipment and machinery, education, and employment. The last module covers the structure of the households. For 2002, 2003, and 2005, two additional modules surveyed the health and education of household members.

The surveys were conducted quarterly with a rotating sample, with 25% of households surveyed being replaced randomly in each year. Our analysis is based on the 2001-2009 waves. However, from 2006 to 2008, the survey methodology was changed, and at each quarter only 3,000 households were surveyed and then annual information for 12,000 households was constructed from the quarterly surveys. Hence the consumption adjusting mechanisms applied to households in the panel for 2006-2008.

Matching households over several years is not straightforward, because the statistical office did not employ a unique ID for new households during rotation. Usually the collecting agency gives a new identification number for new households after the first wave. But this time the numbers were allocated for a fixed pool. Some new households, after the first rotation in 2001-2002, got the household identification numbers of households that had left the survey. Also, measurement errors in the collection and data-input stages do not permit a direct match. Matching households across surveys must rely on demographic and other characteristics of each household member. The following unchangeable characteristics of an individual can be applied for matching: birth year, birth month, gender, and first name; also ethnicity and education of the head of household. In the next section, three matching techniques use the traits of individuals and two use the traits of the head of household.

After time-invariant characteristics of households were tracked for all years, preliminary analysis established that some households had been followed through all waves since 2001. The following administrative factors can explain this. Original data collection is organized through statistical departments at the oblast level; then the gathered data are sent to the ASRK. Regional statistical departments hire local interviewers, who collect the data predominantly from households that had participated in previous waves of the survey; the departments keep the previous panel component. This also reduces the costs for interviewers.

4. Matching Methodology and Reliability Test

4.1 Introduction

This section provides techniques for constructing panel data by matching a person's records across rotating cross-section surveys. For example, the Current Population Survey (CPS) of the USA applies matching for rotating panel surveys (Peracchi & Welch, 1995). The advantage of CPS is the existence of a unique identifier for the household. Welch (1993) applies matching by age, gender, and race for household members through several steps. Feng (2004) used matched data sets to identify and correct several reporting and recording errors in the CPS.

We now discuss matching in the KHBS data set. First, data for 2001-2005 and 2009 were matched on a quarterly basis. The total number of households for each year is always less than 12,000, due to attrition between quarters and missing data for specific variables. But the household attrition rate between quarters for these periods is less than 5%.

We employ several techniques to construct the panel data set. The basis for Matching Technique N1 is the household's ID (HHID[24]), year of birth, gender, and first name of each member of the household for different years. The basis for Matching Technique N2 is the household's ID, birth year, birth month, and gender of each individual of the household. The data for Matching Technique N3 is the household's ID, birth year, and birth month of each individual in the household. Matching Technique N4 uses the head of household's characteristics (such as birth year, gender, and education). Finally, Matching Technique N5 uses the birth year, gender, and ethnicity of the head of household. The panel sample retains the household if at least one member of the household, or the head of household, had the same characteristics.

The attrition rates, reliability, and robustness at each stage for various matching techniques have been evaluated. Assessing reliability draws upon these indicators: the cumulative number of individuals matched in each household with the household size of the previous year; the difference in the birth years of the two oldest members of the household; any difference in marital status of the two oldest members of the household; and the change in marital status of the head of household (for example, from married to divorced). The reliability test is based on the marital status and education of the two oldest members of the household for Matching Techniques 1-3, and on the marital status and education of the head of household for Matching Techniques 4-5. The test shows that Matching Technique N1 is the most reliable and robust. Moreover, it produces lower attrition rates than the other matching techniques (Table 1 in the Appendix).

4.2 Matching Technique N1 and Its Reliability

Matching Technique N1 applies the household's ID as well as the birth year, gender, and first name of an individual. (We cannot use the ethnicity of a household member because no data are collected for it). This approach identifies the first name of each household member, although doing so is problematic because a person's name may have multiple pronunciations or spelling. In fact, one name may vary in character, spelling, and phonetics; other variants include compound names and alternative names. Variations in character may result from capitalization, punctuation, spacing, qualifiers, and abbreviations. All known name-matching techniques, such as Soundex, Phonex, Phonix, NYSIS, Double-Metaphone, Fuzzy Soundex, Levenshtein, and others in Stata, allow one to match English or German first names or name-strings in Latin. But KHBS enter all first names in Cyrillic, so the use of known name-matching techniques is prone to problems. Afterwards the data file of households is transcribed to R software, which permits the use of all commands for string variables (first name of the household member) in Cyrillic. Initially all name-strings are expressed in lowercase and all short forms of given names are converted to long forms. All Cyrillic letters become Latin letters by an application of a special methodology proposed by linguists.

[24]Here HHID is a 10-digit number. The first two digits indicate the region (14 oblasts, two cities). The next two digits indicate the district; the next two, the type of settlement (Nur-Sultan city, village, large city, average-sized city, small city, or Almaty city). The final four digits indicate the household.

Thereafter, various name matching techniques may apply to the dataset. The households with the same birth year, gender, and first name of at least one member remain in the panel. Subsequently, Matching Technique N2 uses HHID, birth year, birth month, and gender of the household member, and Matching Technique N3 is based on HHID, birth year, and birth month for each household member. The attrition rate is 78.5% for Matching Technique N3, 76.5% for Matching Technique N2, and 70.8% for Matching Technique N1. Also, the reliability check based on differences in birth years and marital status of the two oldest members of household indicates that Matching Technique N1 is the most reliable. Moreover, comparison of the graphs of the cumulative percentages of the ratio of matched individuals in the household to the size of household shows that matching technique N1 is the most reliable (Figure 1).

Comparing all the matching approaches, we can conclude that that in terms of quantity, matched households, individuals, and reliability, the matching techniques based on characteristics of individuals are the most appropriate and correct (Table 1). The total number of households left after matching all waves is 2,580, and the attrition rate is 70.82% for Matching Technique N1, one of the lowest among matching techniques.

Finally, Matching Technique N1, which is founded on individual characteristics, is more reliable than others, based on the following indicators: the cumulative percentage of the ratio of individuals matched in each household over household size; and the difference in birth year and marital status of the two oldest members of the household. At the beginning of each matching method, the unique ID for each individual is created for the year 2001. So, the individual can be tracked through the period 2001-2009. Accordingly, the panel data include only those individuals who are in all waves of KHBS 2001-2009 and their households.[25]

5. Representativeness of Unintended Panel Data from the KHBS

This section examines the representativeness of the unintended panel of 2001-2009 constructed by the author. The comparison of main descriptive indicators of the cross-section data to the panel data helps to determine the representativeness of the 2001-2009 panel data constructed by Matching Technique N1.[26]

The regional representation in the panel of all oblasts, except Mangistau, gives evidence of representativeness of the panel on a national level. Not a single household from Mangistau, which is an oil rich region in the western part of the country, is left in the panel. However, this is to be expected, as the density of population in this oblast is one of the lowest in the country; initially, the survey presented only 240 households in the cross-section data.

The comparison of the mean per capita consumption expenditures from the different regions of the cross-section data to the panel data will help to show the variations between the households from the longitudinal data and the nationally representative cross-section data from the KHBS. Table 2 illustrates the differences between the mean regional per capita consumption expenditures for the cross-section data and for the panel data. Also, it describes these differences for the first year of the panel and the final year of the panel. The first six columns of Table 2 depict these differences for nominal values and the next six columns for real values of the mean per capita consumption expenditures.

[25] The shorter panels 2001-2003, 2001-2005, and 2006-2009 have been analyzed too for robustness.

[26] The descriptive statistics of the shorter panels, 2001-2003 and 2001-2006, were also compared to those of cross-section data.

Consumption expenditures include: food (purchased, home produced, and received); and non-food goods and services, excluding housing,[27] housing renovations, the car for hire to transport agricultural goods or construction materials, repair for durables, and tax payments. The consumption aggregate included user value[28] for small durables. When values were missing for a subcomponent of the expenditure aggregate, imputations were made for the value of the specific component. The analysis excludes households where less than 25% of the value of the total expenditure was estimated.

The mean per capita consumption expenditures are larger for households from the cross-section data for the years 2001 and 2009. The average value of differences between the panel data and the cross-section data for the country in 2001 is small (6.33%) and insignificant (Table 2).

The difference in average per capita expenditures for the country was 6.79% in 2009. The difference in mean per capita consumption expenditures between the cross-section and the panel data widens over time.

The second part of Table 2 illustrates the difference in the mean monthly per capita real consumption expenditures in various oblasts between the households in the panel data and the national representative cross-sectional samples for 2001 and 2009. These expenditures have almost the same tendency in variation between the panel data and the cross-section data across the regions. Moreover, the average values of the difference in expenditures across the country were only 6.76% in 2001 and 7.75% in 2009 (Table 2). Even where differences exist in the mean of per capita real consumption expenditures between the cross-section data and the panel, these differences are not significant. Thus the constructed panel dataset for 2001-2009 does not differ significantly from the cross-section data for the same period in terms of consumption aggregates.

Table 3 compares socioeconomic and demographic characteristics of the households for the cross-section and panel datasets of 2001-2009.[29] The poverty headcount indexes, by an application of the absolute poverty line[30] for the panel data, are larger than in the cross-sectional data. The differences are negligible between panel data and cross-section data in poverty measurements, using the relative poverty line, such as the 40th percentile of real per capita consumption expenditures.

The percentage of households headed by males is larger in the panel data than in the cross-section data for the period. The mean number of years of schooling of the head of household increases overall in the panel and the cross-section data. However, this statistic is higher in the cross-section data than in the panel data. Also, the percentage of households headed by ethnic Kazakhs is higher in the panel data, which means that a greater number of ethnic Kazakh households is repeatedly surveyed. In the cross-section data, the share of households headed by an ethnic Kazakh rises, which indicates the demographic tendency for the country (Table 3).

The average age of the head of household increases in the panel data, which is appropriate for longitudinal data. The marital status of the head of household indicates that in the first year of the panel data more married households are represented; but later, at the end of the period in 2009, the widows and the divorced heads of household prevail, which is understandable with the aging of individuals in the panel data. The estimations for the economic status of the head of household demonstrate that the

[27] Rental payments for housing are excluded, because the majority of households in Kazakhstan own the dwelling in which they reside. Over 95% of all households are homeowners.
[28] See Hentschel and Lanjouw (1996).
[29] Descriptive data for the shorter panels, 2001-2003 and 2001-2006, are also compared with cross-section data. These comparisons find little difference between cross-section and unintended panel data.
[30]The subsistence minimum calculated by the ASRK is applied as an absolute poverty line.

percentage of employed workers, pensioners, students, housekeepers, disabled persons, and unemployed workers is almost the same for cross-section and panel data in 2001. However, the percentage of pensioners increased substantially for the panel data compared to cross-section data in 2009, where the percentage of pensioners is 20.5% for the cross-section data and 28.3% for the panel data (Table 3). This can be explained by the aging of individuals in the panel data.

The regional allocation of the households in the panel data indicates that more households settled in rural areas and fewer in Almaty. The dynamics of the household size have different patterns: Initially the size of the household is larger in the panel data than in the cross-sectional data, but in the later period the number of people decreases. This shows the path of demographic development, explained by death or by the departure of children in the household who have become adults. Concerning the composition of the household, females prevail in both panel data and cross-sectional data; however, the ratio of females to males is larger for the cross-sectional data. In general, the number of pensioners is declining in cross-sectional data, but the number of pensioners increases in panel data (Table 3). So, the socioeconomic characteristics of the households from the constructed panel data do not differ significantly from those in the cross-section data. But some differences in the socioeconomic indicators can be easily explained by changes caused by time.

Next we study differences in descriptive statistics for attritted and the non-attritted households between 2001 and 2006, based on 2001 characteristics (Table 4). A comparison of attritted to non-attritted households shows that the percentage of poor households as determined by the absolute poverty line (the subsistence minimum) is larger in the panel data (in other words, for the non-attritted households, since these are the households that remain in the panel). The percentage of poor households is larger among non-attritted households than among attritted ones when we consider households with heads who have secondary and vocational education, Kazakh heads, married heads, and male heads; and among non-attritted households that own their dwellings, that live in rural areas or in the north and south of the country, or that are large. In addition, households in the panel data have a smaller percentage of heads with higher education than do attritted households. Similar differences occur between attritted and non-attritted households in the panel of 2006-2009 (Table 5).

Summing up, the rigorous study of the representativeness and the reliability of the panel data constructed with Matching Technique N1 confirms the robustness of the unintended panel constructed by the author.

6. Checking Attrition

Attrition is the most detrimental and most often mentioned hazard to the value of panel data, since it can create selection bias and measurement errors in the sample. This section illustrates one solution to attrition bias: Use weights obtained from attrition probits based on observables. All investigations of attrition bias here use the household as a unit of study.[31]

[31] As a unit of analysis, we consider the individual and the matching technique based on the individual's characteristics. But we drop the household if no member of it is the same over a two-year period. So, the attrition probits are based on households.

6.1 The Theoretical Model for Selection on Observables

Let us consider a two-year household panel consisting of N households. The output variable of interest for household i in the second year is y_{i2}; x_{i1} denotes the household variables in the first year; and additional instrumental variables that affect only attrition are z_{i1}. Then I can apply a model based on Hausman and Wise (1976, 1977, and 1979), Heckman (1976), and Griliches, Hall, and Hausman (1978):

$$y_{i2} = x_{i1}\beta + \varepsilon_i \qquad y_{i2}\ observed\ if\ A^* > 1 \tag{1}$$

$$A^* = x_{i1}\gamma + z_{i1}\delta + \vartheta_i \tag{2}$$

where ε_i and ϑ_i are error terms .The probability of attrition, A^*, is not observed and is replaced by an attrition dummy, A, which takes the value 0 when both y_{i1} and y_{i2} are observed (that is, no attrition occurs), and the value unity when y_{i2} is not observed (since this implies attrition in the second period). It is frequently difficult to define appropriate instruments from the selection model. So consider a second approach to sample attrition: Estimate inverse probability weights based on auxiliary variables. These weights can be connected to both the attrition and the outcome variables, with a weaker condition required for the z variables. The error terms ε_i and ϑ_i are uncorrelated. Then Equation 2 is specified as a probit:

$$A = x_{i1}\gamma + a_{i1}\delta + \vartheta_i \tag{3}$$

where $A = 0$ for households that remain in the sample, $A = 1$ for attrittors, and a_{i1} are auxiliary variables in the first period. Afterwards a restricted equation is re-evaluated without auxiliary variables:

$$A = x_{i1}\gamma + \varphi_i. \tag{4}$$

Consequently, the ratio of predicted values from Equation 4 and Equation 3 illustrates the inverse probability weights,

$$W_i = \frac{P^r}{P^u} \tag{5}$$

where $P^r = \Pr(A=0|\, x)$ and $P^u = \Pr(A=0|\, x,a)$. (In other words, P^r is the probability of non-attrition in the restricted sample, conditional on x; and P^u is the probability of non-attrition in the unrestricted sample, conditional on x and a. The restricted sample excludes a; the unrestricted sample includes a.)

Equation 5 gives more weight to households that have analogous initial characteristics, and to households that later attrit, than to households with characteristics that make them more likely to stay in the panel.

The problem arises in determining appropriate variables that are correlated with attrition. Potential auxiliary variables may include: age of the head of household, demographic characteristics of household, the quality of interview, and shock variables.

As the previous section mentioned, attrition rates are large for the constructed unintended panel data. Is attrition bias significant in the estimations? Let us answer this question.

6.2 Attrition Probits

The elementary check for random attrition evaluates a probit in which the dependent variable equals one for households that dropped out of the sample in the last wave[32](attrit), and zero otherwise. Explanatory variables are set to baseline values for all variables that can affect the outcome of interest, plus any applicable variables that describe the quality of the interview. It is common to add lagged values of the outcome variable in the attrition probits. As identified by Outes-Leon and Dercon (2008), it is also appropriate to check the pseudo-R-squared value from attrition probits; they can be interpreted as the percentage of attrition that is non-random.

Another common test for random attrition is the pooling test developed by Becketti, Gould, Lillard, and Welch (BGLW) (1988). This test includes regressing an outcome variable from the first wave of a survey on household and community variables, an attrition dummy, and the attrition dummy interacted with other explanatory variables. An F-test of the joint significance of the attrition dummy and the interaction variables identifies whether the coefficients for the explanatory variables differ between households that are retained or attritted from the panel.

Along with the conventional variables on the household demographic features, age and education of the household head, asset ownership, and location, we have specific knowledge of two variables: lagged values of the dependent variable (per capita expenditures); and the household owner of a dwelling.

6.3 Attrition between 2001 and 2009[33]

We will consider the households retained in the panel for 2001-2009 and estimate the probit regression for attrition based on the following sets of explanatory variables. First are the head of the household characteristics, such as age, gender, marital status, ethnicity, and education level. Second are household demographics, such as the number of working-age women and men, the number of non-working-age women and men, the number of children younger than seven, the number of children aged seven to 14, the number of disabled individuals, and the number of individuals with different levels of education. Third is the location of the household, given by a rural dummy variable and by dummies for six regions: "Central" includes Akmola and Karaganda oblasts; "East" covers East Kazakhstan and Pavlodar oblasts; "North" includes Kostanay and North Kazakhstan oblasts, "South" covers Almaty, Kzyl-Orda, South Kazakhstan, and Zhambyl oblasts; "West" includes Aktobe, Atyrau, Mangistau, and West Kazakhstan oblasts;[34] and the cities Almaty and Nur-Sultan (previously named Astana).[35]

Among other independent variables, the monetary value of assets includes the value of large durables owned by households. The logarithm of this value smooths outliers. The ownership of dwelling by the household is also included in the estimation model. However, almost 95% of householders own their homes. The pseudo R-squared value indicates that this set of variables explains only 3.86% of panel

[32] The estimations are also made for subsequent waves (for 2001-2002, 2001-2003, etc.). The results are not substantially different.

[33] The same estimations have been applied for shorter panels between 2001-2005 and 2006-2009. The results are similar.

[34] The South is the poorest region of Kazakhstan; it grows cotton and manufactures intermediate goods. The North is the main wheat-producing area and also specializes in metallurgy and heavy industry such as steel. The Central region produces heavy metals such as chrome, lead, and zinc. It also mines coal and grows wheat and other grains. In the East, hydroelectric power is important as well as the extraction of light metals and the production of heavy equipment. The West produces oil.

[35] Almaty was the capital until 1997, when the government transferred to Astana (now Nur-Sultan) in the central part of the country. These two cities have the lowest poverty levels and the highest means of per capita expenditures. Also, the main descriptive statistics on the household level are not significantly different.

attrition, relative to a model in which the sole "explanatory" variable is a constant (Table 6). The results suggest that out of 29 explanatory variables, eight are statistically significant at the 1% level. In addition, the dummy variable that indicates whether the head of household is Kazakh is statistically significant at the 5% level; and the number of individuals with vocational education and the number of children younger than six are statistically significant at the 10% level. In summary, the main predictors of attrition are the education and ethnicity of the head of household, the number of children younger than six, the number of household members with vocational education, the location variables, and the value of assets.

A Wald test to check whether the coefficients on these variables are jointly equal to zero was conducted. The chi-squared statistic of 263.67 confirms that these coefficients are jointly statistically different from zero. The conclusion is that these variables are significant predictors of the attrition. Also, their coefficients differ statistically from zero at conventional levels of significance.

The BGLW test (Becketti et al., 1988) determines whether attrition is random. In the test, the dependent variable in the regression is a logarithm of per capita consumption expenditures, and independent variables include household characteristics and auxiliary variables as well as their interactions with the attrition variable. With an F-statistic of 5.0E+06, the test for whether the attrition dummy and all the interactions are jointly equal to zero is rejected. So, one discards the notion that attrition is random.

Both tests indicate that attrition is not random. But non-random attrition does not necessarily lead to attrition bias.

The next step is to estimate inverse probability weights (IPWs). The probability of remaining in the sample will be predicted by using the same explanatory variables as before and then will be re-estimated by excluding auxiliary variables.[36] After computing predicted probabilities from unrestricted and restricted attrition probits, the IPWs are calculated.

Finally, the IPWs are applied for the transition matrix. Table 7 below indicates that the percentage of households that are falling into poverty declines from 2.54% [37] without weighting, to 2.52% with weights applied. Also, the percentage of households that are escaping poverty increases from 35.15% without weighting to 35.94% with weighting. The proportion of households that are poor in both periods increased from 9.94% without weighting to 10.07% with weighting. Therefore the influence of IPWs on results of transition matrices is negligible (Table 7a, b).

Despite their simplicity, the IPWs have disadvantages. First, all of the above estimations assume that attrition depends only on observables. Second, all estimations should be repeated for another outcome variable. It is not possible to apply the same weights to different outcome variables. Despite these deficiencies, our estimations based on observables give robust results for panels of different lengths. Moreover, the application of inverse probability weights for poverty measures had only a small influence on poverty estimates.

[36] As auxiliary variables we can take the significant predictors of attrition, such as education and ethnicity of the head of household, the number of children under age six, the location of the household, the number of individuals with vocational training in the household, and the value of household assets.

[37] Poverty measures are calculated based on absolute poverty lines.

7. Conclusions

The main contribution of this study is that for the first time the panel data for Kazakhstan have been constructed based on rotating cross-sections of KHBS for 2001-2009.

The five matching techniques have been applied to construct panel data by applying data on characteristics of a household member or the head of household, such as birth year, birth month, gender, and first name. The analysis of robustness, reliability, representativeness, and attrition shows that Matching Technique N1, which is based on date of birth, gender, and first name of the household member, is more reliable than other matching techniques. Also, Matching Technique N1 keeps more observations of households and individuals in the panel.

Comparison of descriptive statistics of cross-section and panel data shows that, on average, monthly per capita real consumption expenditures in cross-sectional data are larger than in panel data by 6.3-7.8%. The exceptions are West Kazakhstan, Karaganda, and Kostanay oblasts in 2001 and 2009; and Almaty City as well as East Kazakhstan and Pavlodar oblasts in 2001. Differences in mean regional per capita consumption expenditures between cross-section and panel data are not significant in a statistical sense.

The differences in descriptive data of households from the cross-sectional data and the panels are not substantial. The percentage of the households below the absolute poverty line is indeed larger in the panel data than in the cross-section data. However, there are no differences in the percentage of households below a relative poverty line in the two types of datasets. Also, there are more male-headed households, households headed by ethnic Kazakhs, rural households, and large households in panel data than in cross-section data.

Despite the substantial attrition rate of 70.1%, attrition does not bias the estimation of poverty levels. In particular, weighting observations by IPW in poverty transition matrices does not substantially change poverty measurements. Moreover, the levels of poverty measured by relative poverty lines are similar in the two types of datasets.

In conclusion, a rigorous analysis of the reliability and robustness of the panel data shows that it can be used for longitudinal analysis of poverty, inequality, and other social issues. Moreover, the methodology proposed can apply to other Former Soviet Union countries, due to similarities in conducting surveys and questionnaires in national HBS.

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8. Summary

English: The panel dataset has been constructed based on rotating cross-section data of Kazakhstan Household Budget Surveys. The results depict that the constructed panel data is reliable to the measurements of poverty dynamics.

Russian: Панельные данные были построены на основе ежегодных пространственных данных обследовании бюджетов домохозяйств в Казахстане. Результаты показывают, что построенные панельные данные надежны для измерения бедности в динамике.

Kazakh: Панельдік мәліметтер Қазақстандағы үй бюджеттерін жыл сайынғы зерттеу бойынша кеңістіктік мәліметтер негізінде құрастырылды. Нәтижелер көрсеткендей, панельдік деректер уақыт бойынша кедейлікті өлшеу үшін сенімді.

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10. Appendix

Table 1

Comparison of Various Matching Techniques

The robustness test criterions	Matching techniques									
	N1		N2		N3		N4		N5	
	2001-2002	2008-2009	2001-2002	2008-2009	2001-2002	2008-2009	2001-2002	2008-2009	2001-2002	2008-2009
Percentage of HHs with the same size in previous year	85.6	85.52	84.63	83.93	84.56	84.21	83.59	83.4	82.4	81.7
Percentage of HHs with no change in marital status of the head of HH	97.91	97.2	97.05	96.82	96.97	94.42	97	96.5	96.98	96.95
Percentage of HHs where the number of matched individuals equals to size of HH	79.93	76.31	77.78	76.11	78.32	75.49	-	-	-	-
Percentage of HHs where the birth years of first oldest members are equal	99.89	95.67	99.9	94.28	88.51	94.31	96.5	95.5	99.19	95.44
Percentage of HHs where the marital status of first oldest members are equal	99.94	97.52	97.43	97.34	98.11	97.29	71.4	71.5	97.58	96.56
Percentage of HHs where the birth years of second oldest members are equal	98.14	96.79	99.9	91.07	81.58	91.74	93.16	92.2	98.94	91.89
Percentage of HHs where the marital status of second oldest members are equal	99.88	98.11	98.33	98.77	97.71	97.71	70.92	70.4	98.14	97.89
Attrition rate 2001-2009 (%)	70.82		76.5		78.5		90.8		87.39	

Source: Constructed by the author.

Table 2

Comparison of Nominal and Real per Capita Expenditures of the Cross-Section and Panel Data

	Mean of monthly per capita consumption expenditures (in KZT)						Mean of monthly per capita real consumption expenditures (in KZT)					
Region	HBS2001 cross-sections(a)	Panel based on data of 2001(b)	HBS2009 cross-sections©	Panel based on data of 2009(d)	Differences of per capita monthly exp,(%) (a)-(b)	©-(d)	HBS2001 cross-sections(a)	Panel based on date of 2001	HBS2009 cross-sections ©	Panel based on data of 2009(d)	Differences of per capita monthly exp,(%) (a)-(b)	(c)-(d)
Akmol	7,412.31	7,035.68	25,088.71	23,986.19	5.08	4.39	6,927.39	6,575.41	23,273.4	22,250.6	5.35	4.60
Aktobe	7,738.48	7,347.23	2,.429.06	24,619.48	5.06	3.18	7,328.11	6,957.61	24,035.0	23,269.8	5.33	3.29
Almaty	5,269.80	5,028.71	20,071.13	18,984.67	4.58	5.41	4,929.66	4,704.12	19,024.8	17,994.9	4.79	5.72
Atyrau	6,494.40	5,154.66	20,273.12	16,158.45	20.6	20.3	5,925.55	4,703.16	19,125.6	15,243.8	26.0	25.5
W. KZ	6,095.53	5,972.72	22,297.08	23,295	2.01	-4.48	5,680.83	5,566.38	20,760.8	21,689.9	2.06	-4.28
Zhamb	4,075.59	4,058.24	18,875.67	16,344.17	0.43	13.4	3,855.82	3,839.39	17,773.7	15,390.0	0.43	15.5
Karaga	7,717.72	8,263.13	26,649.98	27,134.75	-7.07	-1.82	7,357.22	7,877.15	25,165.2	25,623.0	-6.60	-1.79
Kostan	6.934.56	7.464.57	23,599.11	23,959.3	-7.64	-1.53	6,379.55	6,867.13	21,571.4	21,900.6	-7.10	-1.50
Kzyl-Mangis	4,800.76 7,638.20	4,324.62	21,105.82 18,045.25	19,763.01	9.92	6.36	4,559.13 6,918.66	4,106.96 0	19,930.0 17,251.7	18,662.0 0	11.0	6.79
S. KZ	4,483.43	4,262.83	17,595.71	15,188.41	4.92	13.7	4,290.36	4,079.27	16,599.7	14,328.7	5.17	15.9
Pavlod	7,788.87	7,859.29	24,928.99	23,597	-0.9	5.34	7,547.36	7,615.59	23,629.4	22,366.8	-0.90	5.64
N. KZ	8,276.74	7,624.78	25,824.53	24,880.22	7.88	3.66	7,579.43	6,982,40	24,385.8	23,494.1	8.55	3.80
E. KZ	7,650.06	7,655.07	25,778	25,692.48	-0.07	0.33	7,083.39	7,088.03	24,387.9	24307.0	-0.07	0.33
Astana City	12,927.1	11,455.6	37,644.7	30,608.86	11.4	18.7	12,160.92	10,776.6	35,347.2	28,740.7	12.9	23.0
Almaty City	10,224.7	11,622.1	33,729.97	31,673.7	-13.7	6.1	9,476.09	10,771.2	31,376.7	29,463.9	-12.0	6.49
Sum	115,528	105,129	386,936.87	345,885.69			107,999.4	98,510.4	363,638.	324,726.		
Avg	7,220.51	6,570.57	24,183.55	21,617.86	9	10.6	6,749.97	6,156.90	22,727.4	20,295.4	9.63	12.0
Diff in avg.					6.33	6.79					6.76	7.75

Note: The mean of real monthly per capita consumption expenditures is calculated based on the regional CPI for corresponding years.

Source: Author's calculations based on KHBS.

Table 3

Descriptive Data of the KHBS 2001-2009

Variables	2001 Cross-section	2001 Panel	2009 Cross-section	2009 Panel
Poor by official poverty line	0.449	0.503	0.113	0.123
Poor by relative poverty line	0.290	0.291	0.301	0.269
Head of HH is male	0.533	0.562	0.440	0.443
Years of education of head of HH	10.940	10.950	12.140	11.670
Ethnicity of head of HH :				
1-Kazakh	0.461	0.507	0.526	0.503
2-Russian	0.382	0.340	0.342	0.343
3-Ukranian	0.054	0.061	0.045	0.056
4-Uzbek	0.011	0.011	0.012	0.016
5- Tatar	0.021	0.016	0.020	0.020
6- Uigur	0.011	0.014	0.009	0.009
7-German	0.020	0.018	0.016	0.021
8-Other	0.040	0.033	0.030	0.033
Age of head of HH	50.550	49.990	49.680	54.050
Marital status of head of HH:				
1-married	0.657	0.678	0.638	0.586
2- never married	0.042	0.038	0.058	0.031
3 – divorced	0.100	0.089	0.117	0.111
4- widow	0.201	0.196	0.187	0.273
The status of head of HH:				
0-employed	0.684	0.694	0.743	0.661
1-student	0.002	0.002	0.001	0.000
2-pensioner	0.235	0.218	0.205	0.283
3-housekeeper	0.026	0.023	0.023	0.020
4- disabled person	0.017	0.025	0.017	0.023
5- unemployed	0.030	0.029	0.010	0.013
6- Other	0.007	0.008	0.001	0.001
Type of settlement :				
1-Astana city	0.020	0.022	0.020	0.019
2- Rural settlement	0.370	0.514	0.446	0.527
3-Large cities	0.320	0.306	0.327	0.288
4- medium-sized cities	0.073	0.057	0.075	0.059
5- small towns	0.130	0.053	0.045	0.065
6- Almaty city	0.088	0.048	0.087	0.041
Household size	3.800	4.210	3.447	3.443
Quantity of female in HH	2.017	3.500	1.900	3.710
Quantity of male in HH	1.790	3.720	1.590	3.170
Quantity of children in HH	1.240	1.480	0.923	0.821
Quantity of elderly in HH	0.430	0.380	0.365	0.455
Sample size	11679	2850	11782	2850

Source: Author's calculations based on KHBS. The government has reclassified some small cities as rural. The descriptive statistics are available for all years.

Table 4

Descriptive Data for the Attritted and Non-Attritted Households of the Panel Data 2001-2006

Sample size	**Panel 2001-2006(N=3925)**		**Attritting households (N=4918)**	
Variables	Mean(frequency)	Std.dev	Mean(frequency)	Std.dev
Poor	0.477		0.422	
Head of HH is male	0.435		0.433	
Head of HH has secondary education	0.208		0.189	
Head of HH has vocational education	0.321		0.283	
Head of HH has higher education	0.127		0.140	
Ethnicity of head of HH is Kazakh	0.480		0.455	
Ethnicity of head of HH is Russian	0.363		0.388	
Age of head of HH	34.710	23.120	36.890	22.130
Owner of the dwelling	0.958		0.943	
Marital status of head of HH				
1-married	0.698		0.647	
2- never married	0.030		0.046	
3 - divorced	0.079		0.106	
4- widow	0.193		0.202	
Location:				
Rural	0.430		0.342	
Central	0.156		0.184	
West	0.100		0.079	
North	0.166		0.120	
South	0.218		0.174	
AlmatyAstana	0.068		0.125	
Household size	4.109	2.075	3.700	1.990
Quantity of female in HH	0.022	1.230	1.960	1.160
Quantity of male in HH	1.938	1.328	1.740	1.300
Quantity of working age men in HH	1.097	0.879	1.020	0.880
Quantity of working age women in HH	1.162	0.794	1.060	0.790
Quantity of nonworking age men in HH	0.113	0.318	0.120	0.320
Quantity of nonworking age women in HH	0.309	0.482	0.320	0.480
Quantity of children under 7	0.373	0.683	0.340	0.640
Quantity of children between 7 and 14	0.754	0.929	0.590	0.840
Quantity of children between 15and 17	0.299	0.564	0.250	0.510
Quantity of disabled in HH	0.055	0.229	0.043	0.204
Quantity of HH members with secondary education	1.388	2.110	0.997	1.360
Quantity of HH members with vocational education	1.178	1.594	0.895	1.070
Quantity of HH members with higher education	0.109	0.311	0.122	0.328
Log of total value of assets in KZT	9.820	1.387	9.800	1.460

Log of per capita consumption expenditures	8.605	0.608	8.681	0.633

Source: Author's calculations based on KHBS.

Table 5

Descriptive Data for the Attritted and Non-Attritted Households of the Panel Data 2006-2009

Sample size	**Panel 2006-2009(N=2444)**		**Attritting households (N=8110)**	
Variables	Mean(frequency)	Std.dev	Mean(frequency)	Std.dev
Poor	0.477		0.422	
Head of HH is male	0.435		0.433	
Head of HH has secondary education	0.208		0.189	
Head of HH has vocational education	0.321		0.283	
Head of HH has higher education	0.127		0.140	
Ethnicity of head of HH is Kazakh	0.480		0.455	
Ethnicity of head of HH is Russian	0.363		0.388	
Age of head of HH	34.710		36.890	22.130
Owner of the dwelling	0.958		0.943	
Marital status of head of HH				
1-married	0.698		0.647	
2- never married	0.030		0.046	
3 - divorced	0.079		0.106	
4- widow	0.193		0.202	
Location:				
Rural	0.430		0.342	
Central	0.156		0.184	
West	0.100		0.079	
North	0.166		0.120	
South	0.218		0.174	
AlmatyAstana	0.068		0.125	
Household size	4.109	2.075	3.700	1.990
Quantity of female in HH	0.022	1.230	1.960	1.160
Quantity of male in HH	1.938	1.328	1.740	1.300
Quantity of working age men in HH	1.097	0.879	1.020	0.880
Quantity of working age women in HH	1.162	0.794	1.060	0.790
Quantity of nonworking age men in HH	0.113	0.318	0.120	0.320
Quantity of nonworking age women in HH	0.309	0.482	0.320	0.480
Quantity of children under 7	0.373	0.683	0.340	0.640
Quantity of children between 7 and 14	0.754	0.929	0.590	0.840
Quantity of children between 15and 17	0.299	0.564	0.250	0.510
Quantity of disabled in HH	0.055	0.229	0.043	0.204
Quantity of HH members with secondary education	1.388	2.110	0.997	1.360
Quantity of HH members with vocational education	1.178	1.594	0.895	1.070

Quantity of HH members with higher education	0.109	0.311	0.122	0.328
Log of total value of assets in KZT	9.820	1.387	9.800	1.460
Log of per capita consumption expenditures	8.605	0.608	8.681	0.633

Source: Author's calculations based on KHBS.

Table 6

Attrition Probits for Panel 2001-2009

Dependent variable A	2001-2009	
Variable (2001 values)	Coefficient	Std. Err
Constant	1.9232*	0.2601
Household head characteristics		
Age of the head of household	0.0003	0.0008
Age of household head squared	0.0000	0.0000
Gender of the head of household (1 –if male, 0-female)	0.0357	0.0283
Head of household has secondary education	-0.2112*	0.0384
Head of household has vocational education	-0.2128*	0.0350
Head of household has higher education or scientific degree	-0.1833*	0.0455
(Omitted category –head has not completed secondary education)		
Head of household is married	-0.0144	0.0336
Ethnicity of head of household is Kazakh	0.0882**	0.0410
Ethnicity of the head of household is Russian	-0.0606	0.0400
(Omitted category –the ethnicity of the head is other)		
Household characteristics		
Size of household in 2001	-0.0181	0.0270
Number of working age men in household	0.0312	0.0342
Number of working age women	-0.0112	0.0362
Number of non-working age men	0.0435	0.0539
Number of non-working age women in household	0.0135	0.0444
Number of children under age six	0.0574***	0.0329
Number of children between seven and fourteen years	-0.0373	0.0315
Number of disabled individuals in household	-0.0899	0.0602
Number of individuals with secondary education in household	-0.0032	0.0155
Number of individuals with vocational education in household	-0.0281***	0.0165
Number of individuals with high education	-0.0596	0.0466
Household is located in Rural area	-0.4008*	0.0314
Household is located in Central part of country	-0.2056*	0.0402
Household is located in Western part of country	-0.0270	0.0547
Household is located in Northern part of country	-0.2493	0.0433
Household is located in Southern part of country	-0.1631*	0.0405
Household is located in Almaty and Astana	-0.2213*	0.0507
(Omitted category – household located in East)		
Natural logarithm of per capita consumption expenditures	-0.0425	0.0293
Logarithm of value of all assets	-0.0153*	0.0108
Household is owner of dwelling	-0.1717	0.0648
Pseudo R^2	0.0386	

Source: Author's calculations based on KHBS 2001-2009.

* P<0.01, **P<0.05, ***P<0.1

Table 7(a)

Poverty Status Transitions for Panel 2001-2009 Without Inverse Probability Weights

		2009		
		Not poor(%)	Poor(%)	
2001	Not poor(%)	52.37	2.54	54.91
	Poor(%)	35.15	9.94	45.09
		87.51	12.49	

Table 7(b)

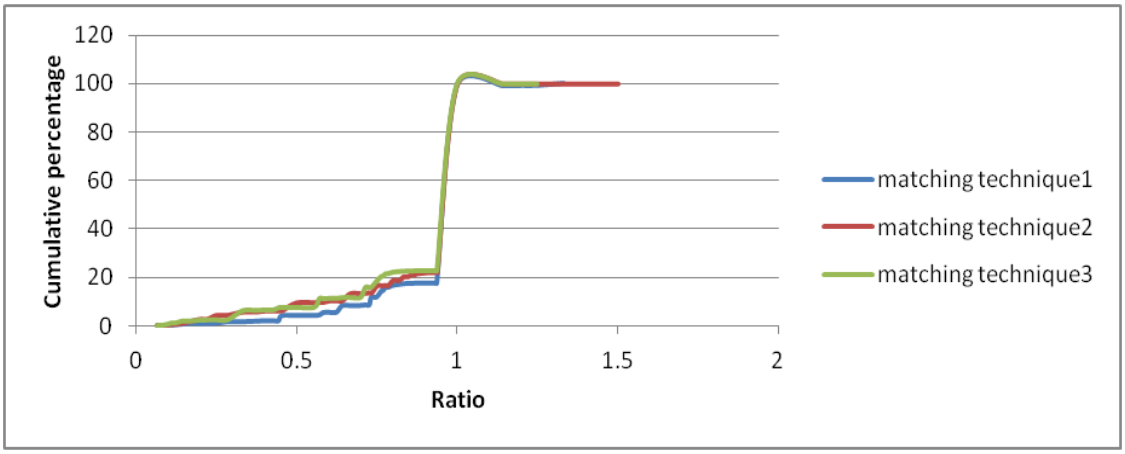
Poverty Status Transitions for Panel 2001-2009 With Inverse Probability Weights

		2009		
		Not poor(%)	Poor(%)	
2001	Not poor(%)	52.48	2.52	55.00
	Poor(%)	34.94	10.07	45.00
		87.42	12.58	

Source: Author's calculations based on KHBS 2001-2009.

Figure 1

The Cumulative Percentage of the Number of Individuals Matched in 001-2002 Over the Household Size in Previous Years by Matching Techniques N1, N2, N3



Source: Created by the author based on KHBS 2001-2002.

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