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## Article

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# Net operating working capital and firm value: A cross-country analysis

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## Abstract

Here, we use a sample of firms from 30 countries during the period 1995–2013 to examine the relationship between net operating working capital (NWC) and firm value. Specifically, we show that the value of NWC varies across countries and that it depends on both investor protection and a country's financial and economic development. Our findings imply that shareholders value NWC more in countries with strong enforcement of investor rights, and greater financial and economic development.

**Jel Classification:** G15; G18; G31; G32

## Keywords

Net operating, working capital, market value, investor protection, financial development, economic development

## Introduction

Many corporate financial executives believe that working capital management is an important determinant of firm value (Kieschnick et al., 2013). Actually, net operating working capital (NWC) investment presents positive and negative effects on firm performance. As Deloof (2003) suggests, greater net investment in NWC allows firms to increase their sales and profitability. While granting trade credit affects sales positively (Brennan et al., 1988; Emery, 1984; Petersen & Rajan, 1997), larger inventories can reduce supply costs and price fluctuations, as well as protect against the loss of business due to product scarcity (Blinder & Maccini, 1991). Moreover, firms might obtain an important discount for early payments by reducing supplier financing (Ng et al., 1999; Wilner, 2000). Alternatively, greater NWC might involve more financing and opportunity costs, and firms face additional financing expenses, which increases their credit risk (Kieschnick et al., 2013) and increases the probability of bankruptcy. Furthermore, NWC might also affect firm value as a consequence of the agency costs associated with their facility to be converted in cash. Indeed, NWC can act as a reserve of liquidity because of their reversibility, unlike for fixed assets (Fazzari & Petersen, 1993). The literature has shown

that NWC acts as a substitute for cash (e.g., Bates et al., 2009; Opler et al., 1999), and firms can use NWC as an internal source of finance to fund firm growth (e.g., Buchmann et al., 2008; Sopranzetti, 1999). Thereby, large NWC might provoke agency conflict between managers and shareholders because the former might easily convert part of NWC into cash and use these funds for private benefits or for investing in projects of their personal interest, generating the free cash flow problem (Jensen, 1986).

Agency cost associated with liquid assets and their facility to convert them into private benefits are affected by the investor protection of the country where the firm is established. As La Porta et al. (1998) indicate, the extent to which agency problems between corporate insiders and outsiders can be mitigated depends on both the content of the laws and the quality of their enforcement. Indeed, the

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value of cash holdings is lower in countries with weak investor protection since it exacerbates the free cash flow problem (Dittmar & Marth-Smith, 2007; Pinkowitz et al., 2006). Similarly, we would expect that the value of NWC depends on investor protection, and better investor protection might reduce the expropriation of outsiders by insiders, making it more difficult for the latter to convert part of the NWC into private benefits that increase their own welfare. However, to our knowledge, this research question has not been addressed yet by financial literature.

Previous empirical research has attempted to analyze the relationship between working capital management and a firm's value in single countries (Kieschnick et al., 2013 and Aktas et al., 2015, for the United States; Baños et al., 2014, for the United Kingdom). These works find evidence for the existence of a level of investment in NWC that balances cost and benefits, and they demonstrate that the value of NWC is influenced by some firm characteristics, such as future sales expectations, financial constraints, and bankruptcy risk. Recently, Ben-Nasr (2016) studied the effect of state and foreign ownership on the value of NWC by using a multinational sample of privatized firms. However, the value of NWC across countries and the impact of the institutional environment on this remain unexplored.

In this article, we extend the financial literature by studying the effect of shareholder protection on the value of NWC. We analyze a sample of 30 countries during the period 1995–2013. We contribute to the literature in several ways. First, we study whether the value of NWC varies across countries. Second, we analyze whether the value of NWC depends on laws, the quality of their enforcement, or a country's level of financial and economic development. Thus, this study complements previous research on the value of NWC and the legal environment. Finally, we also contribute evidence to the debate over the role of the institutional setting in shaping firms' financial policies.

We find evidence for the following conclusions: the value of NWC varies across countries; the investment in NWC is worth more in countries with more efficient law enforcement, and the country's financial and economic development positively affects the value of NWC. In summary, our findings show that the value of NWC across the world is related to investor protection, the development of financial markets, and a country's level of economic development.

This article is organized as follows. "The value of NWC across the world" section presents a literature review that explains the relationship between the value of NWC and investor protection and a country's financial and economic development in more detail. In "Model and methodology" section, we describe our model and methodology. We present our sample and data in "Data" section. In "Empirical evidence" section, we report the univariate and multivariate results of our tests. Finally, last section concludes with a summary of our findings.

## The value of NWC across the world

Corporate finance literature defines NWC as the sum of accounts receivable and inventories net of accounts payable. Investment in NWC depends on the firm's cash conversion cycle (number of days necessary to transform into cash funds tied up in inventories and accounts receivable minus days delaying payment to suppliers). When firms increase NWC, they tie up financial resources, and decreasing NWC increases the free cash flows. Therefore, firms can release cash for other uses managing their NWC (reducing stock, improving bill collection of customers, or delaying payment to suppliers), what provides the firm with financial flexibility for uncertain future contingencies.

The role played by NWC as a provision of liquidity has been pointed out for both academics and practitioners. Regarding the former, Fazzari and Petersen (1993) indicated that working capital could act as a reserve of liquidity in case of future cash shortfalls because of its reversibility, unlike the irreversibility of fixed investments; actually, it is considered a substitute for cash in the literature (Bates et al., 2009; Opler et al., 1999, among others). Moreover, firms facing financial distress or with difficulties accessing finance might use working capital as an internal source of finance. In this sense, firms in financial distress or with difficulties for financing new projects have a higher propensity to sell their accounts receivable (Sopranzetti, 1999). Moreover, business groups, which are more prominent in countries with lower investor protection, might also use a commercial transaction for engaging in tunneling activities by using related party transaction (Bona-Sánchez et al., 2017). From the practitioner's perspective, firms usually have too much investment in NWC that can be transformed in cash for more efficient uses (Ek & Guerin, 2011; Ernst and Young, 2016). In the same vein, Buchmann et al. (2008) pointed out that working capital is a potential source of cash that can be used for financing firm growth. In this sense, Zeidan and Shapir (2017) show that firms overinvest in NWC and that they might improve their profitability by reducing their cash conversion cycle. Consequently, considering the strong connection between NWC and cash, the management of NWC might provoke agency conflicts associated to the free cash flow problem since controlling shareholders can convert current assets into private benefits at a lower cost than that of converting fixed assets (Myers & Rajan, 1998).

According to Jensen (1986), large cash holdings can increase the conflicts of interest between managers and shareholders, since this excess of liquidity can cause discretionary behavior by managers against the interests of shareholders (free cash flow problem). Thereby, managers and controlling shareholders prefer to maintain more cash than is necessary because it provides them of flexibility for using these funds in private benefits or for investing in projects of their personal interest. Moreover, cash flow in

excess to that required for financing firm projects might provoke investment in less profitable projects.

In this context, investor protection plays an important role in reducing the appropriation of private benefits by controlling shareholders. La Porta et al. (2000) show how laws and the effectiveness of their enforcement vary across countries. While in many countries the expropriation of minority shareholders by managers and controlling shareholders (insiders) is extensive, in other countries outside investors are better protected by laws. When outside investors finance firms, they face risk because the returns on their investments might never materialize if the controlling shareholders or managers expropriate those (La Porta et al., 2000). As these authors indicate, expropriation can take a variety of forms, but in all cases, insiders use the profits of the firm to benefit themselves rather than returning the money to outside investors. For example, the extent to which controlling shareholders can extract private benefits from their position depends largely on how well the interests of outside investors are protected (Pinkowitz et al., 2007).

Empirical research shows that firms operating in countries with poor investor protection present higher levels of cash holdings than those established in countries with good protection (e.g., Dittmar et al., 2003; Kalcheva & Lins, 2007). Moreover, consistent with the agency predictions, the contribution of cash holding to firm value is precisely lower in those countries where corporate governance is poor (Dittmar & Marth-Smith, 2007; Pinkowitz et al., 2006). These findings demonstrate that outside investors discount the value of cash holdings in countries with poor investor protection to reflect their expectation that they will not receive the full benefit of these assets. Similarly, as explained above, controlling shareholders can easily convert part of NWC into private benefits and at a lower cost, so investors are expected to value NWC less in those countries where they are less protected by laws. Therefore, our first hypothesis is as follows:

**Hypothesis 1:** A one-dollar increase in NWC contributes less to firm value in countries with weak investor protection.

The efficiency of legal enforcement might also affect investor protection. La Porta et al. (1998) indicate that a strong system of legal enforcement could substitute for weak rules because active and well-functioning courts can step in and rescue investors abused by the management.

Thus, legal enforcement quality is important because it is responsible for the fulfillment of laws and consequently how investor's rights are protected. Previous studies by Pinkowitz et al. (2006) and Kyröläinen et al. (2013) show that the quality of the legal system has a positive effect on the value of cash. Similarly, legal enforcement can also affect the value of NWC. For example, the values of the

use and offer of trade credit are also expected to depend on the legal enforceability of the contract. When a firm offers trade credit, it delivers goods to its customer, who does not pay immediately but promises to pay at a later date. This implies an implicit financing contract in which the supplier assumes the risk that the customer will not pay in the future. In the absence of the capacity to repossess goods, suppliers in countries with inefficient legal systems might be unwilling to supply goods on trade credit and might instead require cash payments (Demirguc-Kunt & Maksimovic, 2001). Consequently, we would expect a higher value of NWC for firms in countries with strong enforcement of investor rights. Then, the second hypothesis is proposed:

**Hypothesis 2:** A one-dollar increase in NWC contributes less to firm value in countries with weak legal enforcement.

## Model and methodology

To determine whether the value of NWC varies across countries, we use the valuation model proposed by Fama and French (1998), which employs cross-section regressions of firm value on earnings, investment, and financing variables. Specifically, following the approach used by Pinkowitz et al. (2006) to study the value of cash, we include the NWC as an independent variable in this model and adjust the measurement of net assets. In addition, we use 1-year differences instead of 2-year differences to reduce the number of observations lost. Thus, our basic regression specification is<sup>1</sup>

$$\begin{aligned} V_{i,t} = & \beta_0 + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} \\ & + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} \\ & + \beta_8 dRD_{i,t+1} + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} \\ & + \beta_{13} dD_{i,t} + \beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \beta_{16} dNWC_{i,t} \\ & + \beta_{17} dNWC_{i,t+1} + \lambda_t + I_j + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where  $X_t$  is the level of variable  $X$  in year  $t$  divided by the level of assets in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$  ( $X_t - X_{t-1}$ ) divided by assets in year  $t$ ;  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t+1$  ( $X_{t+1} - X_t$ ) divided by assets in year  $t$ ;  $V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus  $NWC$ ;  $RD$  is research and development expense;  $I$  is interest expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital calculated as the sum of accounts receivable and inventories net of accounts payable. When research and development expense is missing, we set it to zero.  $\lambda_t$  and  $I_j$  are time and industry dummy variables,

**Table 1.** Descriptive statistics.

	Observations	Mean	SD	Median	10%	90%
$V_{i,t}$	128,629	1.3436	1.0744	1.0346	0.6521	2.2811
$E_{i,t}$	128,629	0.1168	0.2670	0.0647	-0.0254	0.2427
$dE_{i,t}$	128,629	0.0026	0.1034	0.0062	-0.0614	0.0714
$dE_{i,t+1}$	128,629	0.0248	0.0825	0.0084	-0.0385	0.0925
$dNA_{i,t}$	128,629	0.0491	0.1823	0.0448	-0.1323	0.2416
$dNA_{i,t+1}$	128,629	0.0779	0.2546	0.0413	-0.1198	0.2768
$RD_{i,t}$	128,629	0.0948	0.1512	0.0184	0.0000	0.3214
$dRD_{i,t}$	128,629	0.0106	0.0601	0.0000	-0.0112	0.0458
$dRD_{i,t+1}$	128,629	0.0167	0.0939	0.0000	-0.0129	0.0471
$I_{i,t}$	128,629	0.0114	0.0125	0.0076	0.0003	0.0273
$dI_{i,t}$	128,629	0.0001	0.0065	0.0000	-0.0046	0.0057
$dI_{i,t+1}$	128,629	0.0006	0.0070	0.0000	-0.0042	0.0063
$D_{i,t}$	128,629	0.0104	0.0181	0.0039	0.0000	0.0296
$dD_{i,t}$	128,629	0.0008	0.0098	0.0000	-0.0021	0.0058
$dD_{i,t+1}$	128,629	0.0012	0.0109	0.0000	-0.0021	0.0063
$dV_{i,t+1}$	128,629	0.1526	0.9630	0.0404	-0.3667	0.7143
$dNWC_{i,t}$	128,629	0.0106	0.0702	0.0076	-0.0553	0.0828
$dNWC_{i,t+1}$	128,629	0.0177	0.0818	0.0075	-0.0518	0.0953

$V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus net operating working capital (NWC);  $RD$  is research and development expense;  $I$  is interest expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital.  $X_t$  is the level of variable  $X$  in year  $t$  divided by the level of assets in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$  ( $X_t - X_{t-1}$ ) divided by assets in year  $t$ ;  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t+1$  ( $X_{t+1} - X_t$ ) divided by assets in year  $t$ .

respectively, which control for time trends and time-invariant industry.

The main coefficient to be analyzed is  $\beta_{16}$  because this reflects the increase in firm value as a consequence of a one-dollar increase in NWC. To investigate whether the value of NWC depends on shareholder protection and enforcement, we allow all the coefficients of the model to vary depending on these characteristics. Because the value of variables that measure investor protection is not available for all analyzed periods, rather than using continuous variables, we split the sample of countries into two groups according to the differences between each of these variables. To confirm our hypotheses, the coefficient  $\beta_{16}$  should be different for both subsamples of countries according to investor protection. This coefficient indicates the change in firm value associated with an additional dollar of NWC. We estimate the model using two alternative estimation methods: Fama–MacBeth (1973) and clustering standard errors at the firm and the year level (Petersen, 2009).

## Data

Data for firm-specific variables were collected from the *COMPUSTAT* database. We use a sample of 30 countries for the period 1995–2013. We exclude financial firms and utilities, and we eliminate firm-year observations with lost values and cases with errors in the accounting data. Next, to reduce the effect of outliers, we trim our sample at the 1% level by dropping 0.5% in each tail of each variable.

These restrictions produced a final sample of 129,116 observations representing 18,753 firms across the world.

Table 1 reports descriptive statistics for dependent and independent variables of our model, and Table 2 displays correlations among all these variables. The correlation coefficient between value and the increase in NWC is positive and significant. This is consistent with previous literature indicating that investment in NWC positively affects market value. Moreover, correlations between independent variables are low, so multicollinearity problems are not expected in the sample.

Table 3 presents descriptive statistics for each country of the dependent variable of our model, that is, the market value of the firm, as well as of our variable of interest, namely, the ratio of NWC to total assets. This table also provides information on the number of observations available for each country. As we would expect, there is a substantial variation in market value and the ratio of NWC to total assets across countries. Specifically, investment in NWC over total assets ranges from 10.48% for Canada to 29.68% for the Netherlands.

Our first contribution comes from estimating Model (1) separately for each of the 30 countries in our sample. Table 4 presents the coefficient of the variable  $dNWC_{i,t}$  for each country, obtained by both estimation methods, Fama–MacBeth (1973) and clustering standard errors by firm and year (Petersen, 2009). The estimated values of this coefficient vary reliably across countries. Conditional on our model, these results are consistent with the view that the value of NWC varies across countries.



**Table 2.** Correlations.

	$V_{i,t}$	$E_{i,t}$	$dE_{i,t}$	$dE_{i,t+1}$	$dNA_{i,t}$	$dNA_{i,t+1}$	$RD_{i,t}$	$dRD_{i,t}$	$dRD_{i,t+1}$	$I_{i,t}$	$dI_{i,t}$	$dI_{i,t+1}$	$D_{i,t}$	$dD_{i,t}$	$dD_{i,t+1}$	$dV_{i,t+1}$	$dNWC_{i,t}$	$dNWC_{i,t+1}$
$E_{i,t}$	.0618***	I																
$dE_{i,t}$	.1113***	.2279***	I															
$dE_{i,t+1}$	.1641***	.2175***	.0352***	I														
$dNA_{i,t}$	.2019***	.0867***	.1436***	.0158***	I													
$dNA_{i,t+1}$	.2295***	.0588***	.0631***	.2193***	.1650***	I												
$RD_{i,t}$	.0895***	.0323***	.0720***	.0213***	.0727***	.0203***	I											
$dRD_{i,t}$	.0988***	.0392***	.0603***	.0252***	.4293***	.0731***	.3222***	I										
$dRD_{i,t+1}$	.1551***	.0474***	.0379***	.1219***	.1106***	.5062***	.1210***	.1298***	I									
$I_{i,t}$	-.0703***	.0664***	-.0051*	.0242***	-.0852***	-.0336***	.1707***	-.0240***	-.0035	I								
$dI_{i,t}$	.0065**	-.0103***	.0402***	.0134***	.2122***	.0235***	.0665***	.1495***	.0119***	.1729***	I							
$dI_{i,t+1}$	.0622***	.0129***	.0012	.0857***	.2428***	.2847***	.0409***	.1789***	.2397***	-.1164***	.1255***	I						
$D_{i,t}$	.1698***	.1590***	.0243***	-.0195***	.0334***	.0350***	.0288***	.0236***	.0434***	-.0860***	.0104***	.0251***	I					
$dD_{i,t}$	.0935***	.0561***	.0925***	.0057**	.0947***	.0391***	.0126***	.0421***	.0318***	-.0411***	-.0017***	.0223***	.4060***	I				
$dD_{i,t+1}$	.0834***	.0456***	.0519***	.1215***	.0654***	.0920***	.0062**	.0117***	.0512***	-.0323***	-.0197***	.0043	-.0055	-.0702***	I			
$dV_{i,t+1}$	.0426***	.0210***	.0460***	.2259***	.0373***	.4465***	.0107***	.0056**	.1864***	-.0150***	-.0089***	.0750***	.0195***	.0244***	.0898***	I		
$dNWC_{i,t}$	.1210***	.0930***	.1983***	.0239***	.1569***	.1056***	.0269***	.1816***	.0580***	-.0662***	.1330***	.1474***	.0434***	.0856***	.0353***	.0239***	I	
$dNWC_{i,t+1}$	.1378***	.0836***	.0619***	.2265***	.1374***	.2037***	.0024	.0532***	.2229***	-.0347***	.0021	.1711***	.0341***	.0366***	.0825***	.2075***	.0585***	I

$V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus net operating working capital (NWC);  $RD$  is research and development expense;  $I$  is interest expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital.  $X_t$  is the level of variable  $X$  in year  $t$  divided by the level of assets in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$  ( $X_t - X_{t-1}$ ) divided by assets in year  $t$ ;  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t+1$  ( $X_{t+1} - X_t$ ) divided by assets in year  $t$ . \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10%, respectively.

**Table 3.** Mean value of  $V_{i,t}$  and  $NWC_{i,t}$  by country.

	Observations	Mean $V_{i,t}$	Mean $NWC_{i,t}$
Argentina	377	1.2426	0.1848
Australia	5,506	1.6222	0.1185
Austria	684	1.0422	0.2432
Belgium	812	1.3141	0.2174
Brazil	977	1.1692	0.1905
Canada	3,077	1.5798	0.1048
Denmark	786	1.5524	0.2787
Finland	980	1.3584	0.2649
France	5,069	1.3816	0.2594
Germany	5,103	1.3146	0.2484
Greece	1,545	1.2174	0.2867
Hong Kong	1,446	1.1800	0.1587
Ireland	396	1.5496	0.1655
Italy	2,141	1.2331	0.2299
Japan	40,509	1.0391	0.1908
Malaysia	5,859	1.0089	0.2569
Mexico	521	1.0981	0.1618
Netherlands	1,065	1.5511	0.2968
New Zealand	493	1.4324	0.1778
Norway	953	1.5028	0.1914
Philippines	602	1.2686	0.1498
Portugal	469	1.1156	0.1879
Singapore	3,755	1.1415	0.2357
South Africa	1,419	1.3575	0.2080
Spain	1,261	1.3636	0.1923
Sweden	1,976	1.6351	0.2512
Switzerland	1,728	1.4957	0.2254
Thailand	3,549	1.1798	0.2418
United Kingdom	10,512	1.5740	0.2074
United States	25,059	1.7719	0.2090
Total	128,629	1.3436	0.2062

$V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt.  $dNWC_{i,t}$  is calculated as  $NWC$  in year  $t$  minus  $NWC$  in year  $t-1$  divided by asset in year  $t$ .

Data on country-specific variables are obtained from multiple sources. We measure the legal protection of minority shareholders against expropriation by insiders with the anti-self-dealing index (*Antiself*) proposed by Djankov et al. (2008). This index captures the regulation of firm self-dealing transactions along three dimensions: disclosure, approval procedures for the transaction, and facilitation of private litigation when self-dealing is suspected. According to Djankov et al. (2008), this index is better than the index of anti-director rights in cross-country empirical work because the law's effectiveness in regulating the self-dealing problem is the basic element of shareholder protection. A higher score of the *Antiself* index implies that the minority shareholders are better protected from the potential self-dealing transactions of corporate insiders.

We use two variables for measuring enforcement. First, we use the International Country Risk Guide's (ICRG)

**Table 4.** Market value of NWC by country.

	Fama–MacBeth	Cluster
Argentina	0.3304	-0.2281
Australia	1.9466	0.2226
Austria	1.0120	0.8378
Belgium	0.8510	1.0411
Brazil	1.6790	0.7492
Canada	1.2026	1.8030
Denmark	3.5454	0.7237
Finland	0.5344	1.1144
France	0.7699	1.1956
Germany	0.5466	0.6955
Greece	-0.2029	-0.1879
Hong Kong	1.5320	1.3705
Ireland	7.5699	0.9915
Italy	0.5840	1.3173
Japan	0.2622	0.4159
Malaysia	-0.0701	0.3910
Mexico	-0.1426	0.9451
Netherlands	0.2011	1.2385
New Zealand	-4.0893	0.5392
Norway	-2.0175	1.5082
Philippines	-2.0927	-0.3087
Portugal	-3.5760	0.0383
Singapore	0.1323	0.1874
South Africa	0.4367	0.6120
Spain	-0.0022	0.1542
Sweden	0.7710	1.1070
Switzerland	1.2532	1.7104
Thailand	0.1142	0.2070
United Kingdom	1.2806	1.4833
United States	1.1491	1.3433

Coefficients of the variable  $dNWC_{i,t}$  for each country obtained by both estimation methods, Fama–MacBeth (1973) and clustering standard errors by both firm and time (Petersen, 2009).

assessment of the tradition of law and order in the country (*Rule of law*) as a measure of the integrity of the legal system. This variable is elaborated by the PRS Group and ranges from 0 to 6. Higher scores indicate a higher *Rule of law* in the country and, hence, greater efficiency of the legal system. Second, we measure the protection of property rights (*Property rights*) with the index of private property rights published by the Heritage Foundation. This is an annual index that measures the degree to which private property rights are protected by a country's laws and the degree to which its government enforces those laws. Moreover, it takes into account the likelihood that private property will be expropriated and analyzes the independence of the judiciary, the existence of corruption within the judiciary, and the capacity of individuals and businesses to enforce contracts. This index ranges between 0 and 100, with a higher score indicating greater legal protection of property rights.

Laws and enforcement established in a country for protecting investors are also an important determinant of

**Table 5.** Country-level variables.

Countries	Antiself	Property rights	Rule of law	Stock market cap	Bond market cap	GDP per capita
Argentina	0.34	39.28	3.71	28.49	5.22	8,132.10
Australia	0.76	90	5.91	115.17	54.73	34,548.21
Austria	0.21	90	6	24.27	41.19	36,783.45
Belgium	0.54	85.5	5.07	64.39	40.74	34,812.81
Brazil	0.27	50	2.17	57.75	18.32	6,152.33
Canada	0.64	90	6	106.77	28.56	33,924.33
Denmark	0.46	90.25	6	59.30	141.82	45,587.68
Finland	0.46	90.24	6	106.59	23.64	36,599.65
France	0.38	72.86	5.01	77.46	43.75	32,919.59
Germany	0.28	90	5.39	46.06	41.55	34,129.24
Greece	0.22	55.71	3.93	51.17	10.38	20,216.86
Hong Kong	0.96	90	4.93	433.71	15.68	28,429.37
Ireland	0.79	89.76	5.99	51.81	60.88	40,883.07
Italy	0.42	60.95	4.91	38.06	31.60	29,436.88
Japan	0.5	79.52	5.34	76.58	42.21	36,820.95
Malaysia	0.95	56.67	3.83	131.38	51.97	5,960.83
Mexico	0.17	50.95	2.53	28.50	12.80	7,357.33
Netherlands	0.2	90	6	102.91	57.13	39,045.58
New Zealand	0.95	91.75	5.87	38.91		24,115.80
Norway	0.42	90	6	53.16	26.27	61,558.79
Philippines	0.22	43.33	2.86	49.85	0.80	1,446.07
Portugal	0.44	70	5.1	38.41	33.09	17,300.25
Singapore	0.81	90	5.1	173.73	16.09	32,674.43
South Africa	1	50	1.85	193.60	16.85	4,880.38
Spain	0.37	70	4.65	75.91	31.81	23,728.91
Sweden	0.33	84.52	5.04	105.03	47.39	41,285.70
Switzerland	0.27	89	5.81	224.21	34.90	55,925.93
Thailand	0.81	59.76	4.8	57.17	11.51	3,118.25
United Kingdom	0.95	89.52	5.36	134.98	16.12	34,376.22
United States	0.65	88.1	5.73	127.24	100.49	41,563.85

*Antiself* measures the legal protection of minority shareholders against expropriation by insiders, *Property rights* is an index of the protection of private property rights published, *Rule of law* assesses the law and order tradition in the country, *Stock market cap* is the stock market capitalization to GDP, *Bond market cap* is the private bond market capitalization, and *GDP per capita* is the gross domestic product per capita (US\$).

financial development because better protected outside investors are more willing to finance firms (La Porta et al., 1997, 1998, 2002). In fact, countries with strong investor protection and legal enforcement present higher financial development (Demirguc-Kunt & Levine, 2001). In this sense, Pinkowitz et al. (2006) point out that measures of enforcement of investor rights are also highly correlated with economic development, and they use measures of financial and economic development as proxies for law enforcement. Similarly, we analyze whether a country's financial and economic development can affect the value of the incremental unit invested in NWC. Thus, investment in NWC could be worth more in countries with broader equity and debt markets, that is, in countries with more developed capital markets, as well as in those with higher gross domestic product (GDP) per capita.

We collected data on a country's financial and economic development, mainly from the *World Development Indicators* and the *Financial Development and Structure*

*Database* of the World Bank. We use two variables as proxies for the degree of financial development: stock market capitalization to GDP (*Stock market cap*) and private bond market capitalization to GDP (*Bond market cap*). The stock market capitalization to GDP and private bond market capitalization to GDP variables come from the *Financial Development and Structure Database* of the World Bank. Countries with higher scores of both ratios are assumed to have more developed capital markets. Finally, we use GDP per capita as a measure of economic development. This information is obtained from the *World Development Indicators* of the World Bank.<sup>2</sup>

Table 5 presents the values for our investor protection variables and the financial and economic development indices from all 30 countries. We can observe important differences among countries in the values of the measures under consideration. We use these values to create a dummy variable that allows us to separate sample countries into two groups based on the median value of each of



these variables. The interaction of this dummy variable with all the independent variables and the constant allows us to determine whether the effect of NWC on firm value depends on investor protection and a country's financial and economic development.

## Empirical evidence

### Univariate analysis

As a preliminary illustration of the possible importance of investor protection and the financial and economic development of a country in the value of NWC, Figures 1 and 2 rank countries according to each country-specific variable commented on in "Data" section and plot their market values of NWC, namely, the coefficients of the variable  $dNWC_{i,t}$  obtained from Model (1) and that are reported in Table 4. Figure 1 plots estimates of the market values of NWC obtained from the Fama–MacBeth (1973) estimation method, and Figure 2 plots the estimated market values of NWC using standard errors clustered at the firm and the year level (Petersen, 2009). Both figures offer a visual representation of the relation between each country-specific variable and the value of NWC. Graphs show that shareholders in countries with stronger investor protection, greater stock market capitalization-to-GDP ratio, and a greater level of economic development value NWC more. With regard to the private bond market capitalization, the relation is unclear because of the slope changes according to the estimation method used.

### Multivariate analysis

To test our hypotheses, we separate sample countries into two groups based on the median value of each of the country-specific variables proposed. Table 6 specifies the group each country belongs to for each variable. When we use shareholder protection variables (*Antiself*, *Property Right*, and *Rule of law*), countries with stronger rights and countries with better quality of law enforcement take a value of 1, and 0 otherwise. In regard to financial and economic development, countries with greater stock market capitalization to GDP and private bond market capitalization to GDP, and firms with higher GDP per capita take a value of 1, and 0 otherwise.

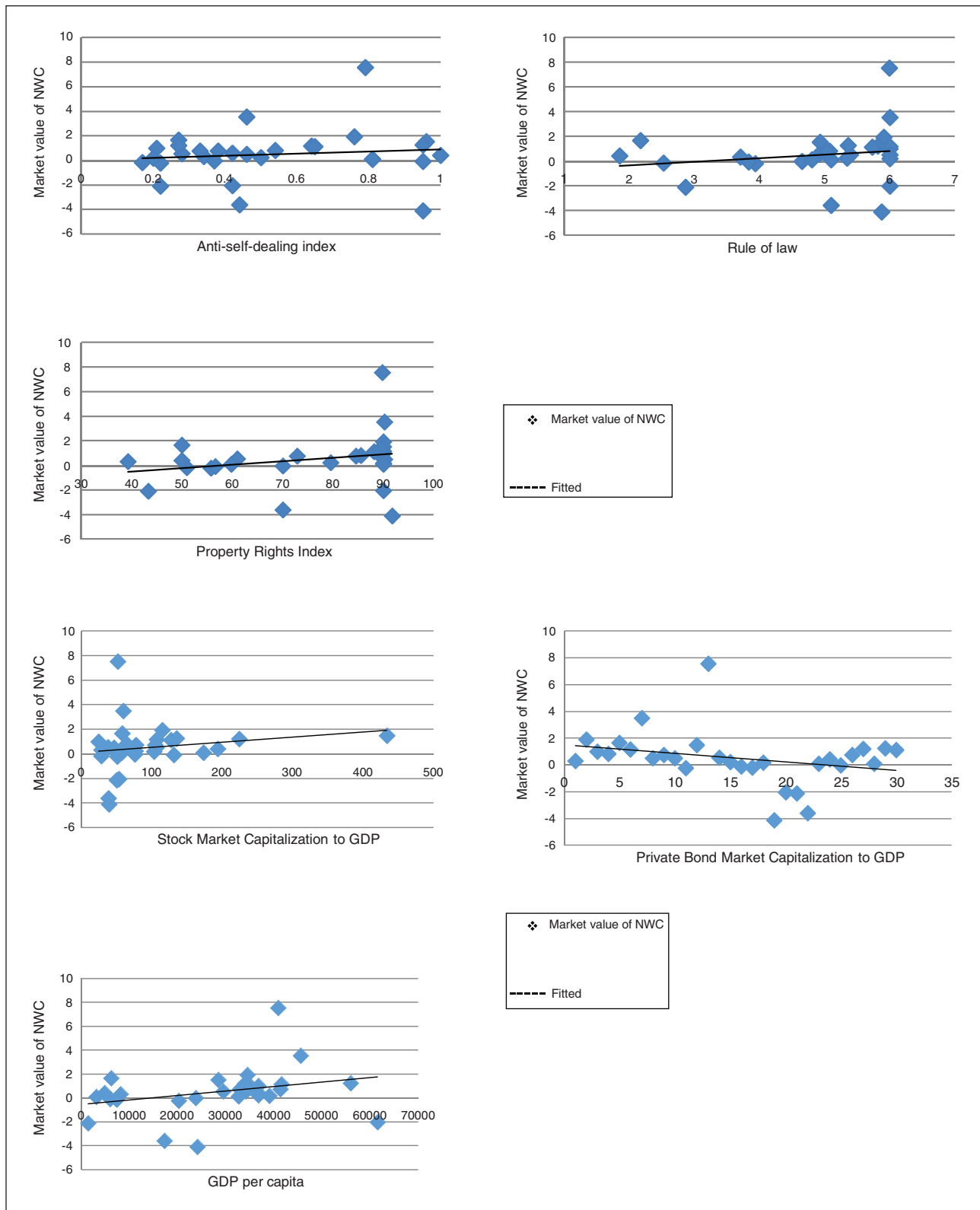
In Tables 7 and 8, we first present the estimation of the model for the full sample. Next, we interact each dummy variable with all the independent variables and the constant, which allows us to examine whether the value of NWC depends on investor protection using Fama–MacBeth (1973) and standard errors clustered by firm and year (Petersen, 2009), respectively. With regard to the legal protection of minority shareholders against expropriation, we do not find evidence that the anti-self-dealing

index (*Antiself*) influences the value of investment in NWC. Although we find that the coefficient of the change in NWC is greater in countries with stronger legal protection, the difference in coefficients is not significant for either of the two estimation methods.

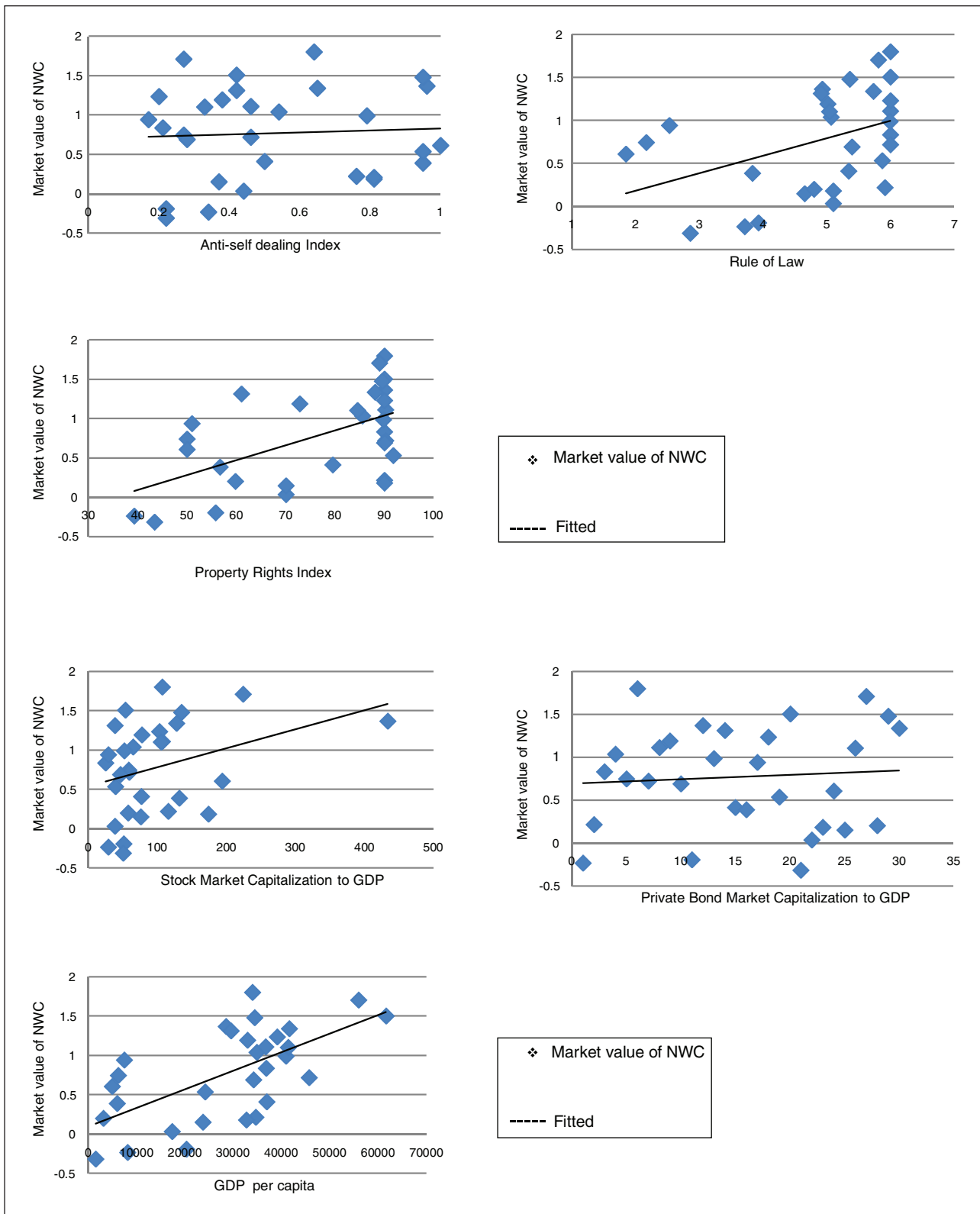
Next, in Tables 7 and 8, we also examine how the enforcement of laws affects the value of NWC. Previous research (Bae & Goyal, 2009; Boubakri & Ghouma, 2010; La Porta et al., 1998) demonstrates that the enforcement of laws is more important than rights written into the laws for investor protection. When we use the *Rule of law* variable, we find that the value of NWC is greater in countries with more efficient legal systems. Specifically, we find that a one-dollar increase in NWC is associated with an increase in firm value of US\$1.17 using Fama–MacBeth (US\$1.22 using clusters at firm and year level) in countries with a higher rule of law and an increase of US\$0.50 (using Fama–MacBeth) and US\$0.64 (using clusters at firm and year level) in countries with a lower rule of law score. Similarly, we find that the coefficient of the change in NWC is slightly greater than one for countries with greater legal protection of property rights and lower than one for the other countries. This seems to indicate that shareholders think it is easier for insiders to convert part of NWC into private benefits when outsiders are less protected by law. This implies that outside investors discount NWC in countries with poor law enforcement.

Finally, Tables 9 and 10 report the relationship between the value of NWC and measures of a country's financial and economic development. Previous literature suggests that both laws and the enforcement of investor rights are highly correlated with financial and economic development. We then analyze the influence of the development of stock and private bond markets on the value of NWC. Specifically, we use the ratio of stock market capitalization to GDP and the ratio of private bond market capitalization to GDP as proxies for the degree of financial development. Again, results show that a dollar of NWC is valued by shareholders at roughly a dollar in countries that are more financially developed, while it is worth much less in countries with lower scores for both ratios. For example, using Fama–MacBeth (1973), in Table 9 we observe that an additional dollar of NWC is associated with a change in firm value of US\$0.57 (US\$0.77) in countries with low stock market development (private bond market development) and a change of about US\$1.06 and US\$1.05, respectively, in countries with high development of both markets. These results are weaker when we estimate by clusters at firm and year level (in the limit of the statistical significance for stock market development and not significant for bond market development) of NWC.

Finally, we find that NWC contributes significantly more to firm value in countries with higher economic development. In particular, the results indicate that a



**Figure 1.** Market value of NWC by institutional characteristics. Coefficients of the variable  $dNWC_{i,t}$ , estimated by Fama–MacBeth (1973) and the country-level variables. *Antiself* measures the legal protection of minority shareholders against expropriation by insiders, *Property rights index* is an index of the protection of private property rights published, *Rule of law* assesses the law and order tradition in the country, *Stock market capitalization* is the stock market capitalization to GDP, *Bond market capitalization* is the private bond market capitalization, and *GDP per capita* is the gross domestic product per capita.



**Figure 2.** Market value of NWC by institutional characteristics. Coefficients of the variable  $dNWC_{it}$ , estimated clustering standard errors by both firm and time (Petersen, 2009) and the country-level variables. *Antiself* measures the legal protection of minority shareholders against expropriation by insiders, *Property rights index* is an index of the protection of private property rights published, *Rule of law* assesses the law and order tradition in the country, *Stock market capitalization* is the stock market capitalization to GDP, *Bond market capitalization* is the private bond market capitalization, and *GDP per capita* is the gross domestic product per capita.

**Table 6.** Country groups by institutional characteristics.

	Antiself	Property rights	Rule of law	Stock market cap	Bond market cap	GDP per capita
Argentina	0	0	0	0	0	0
Australia	1	1	1	1	1	1
Austria	0	1	1	0	1	1
Belgium	1	0	0	0	1	1
Brazil	0	0	0	0	0	0
Canada	1	1	1	1	0	1
Denmark	1	1	1	0	1	1
Finland	1	1	1	1	0	1
France	0	0	0	1	1	0
Germany	0	1	1	0	1	1
Greece	0	0	0	0	0	0
Hong Kong	1	1	0	1	0	0
Ireland	1	1	1	0	1	1
Italy	0	0	0	0	0	0
Japan	1	0	1	1	1	1
Malaysia	1	0	0	1	1	0
Mexico	0	0	0	0	0	0
Netherlands	0	1	1	1	1	1
New Zealand	1	1	1	0		0
Norway	0	1	1	0	0	1
Philippines	0	0	0	0	0	0
Portugal	0	0	0	0	1	0
Singapore	1	1	0	1	0	0
South Africa	1	0	0	1	0	0
Spain	0	0	0	1	1	0
Sweden	0	0	0	1	1	1
Switzerland	0	1	1	1	1	1
Thailand	1	0	0	0	0	0
United Kingdom	1	1	1	1	0	1
United States	1	1	1	1	1	1

*Antiself* measures the legal protection of minority shareholders against expropriation by insiders, *Property rights* is an index of the protection of private property rights published, *Rule of law* assesses the law and order tradition in the country, *Stock market cap* is the stock market capitalization to GDP, *Bond market cap* is the private bond market capitalization, and *GDP per capita* is the gross domestic product per capita. Countries with higher investor protection variables (*Antiself*, *Property rights*, and *Rule of law*) take a value of 1, and 0 otherwise. Countries with greater financial and economic development (*Stock market cap*, *Bond market cap*, *GDP per capita*) take a value of 1, and 0 otherwise.

one-dollar increase in NWC is associated with an increase in the firm value of slightly more than one dollar in these countries but with an increase of about US\$0.41 (US\$0.59) in countries with lower economic development. Thus, consistent with the findings of previous studies (e.g., Pinkowitz et al., 2006) that show that cash is worthless in countries with a low level of economic development, we also find that NWC is valued less in these countries.

In summary, the results from this study show that a dollar of NWC is worth roughly a dollar to shareholders in countries with strong enforcement of the law and greater financial and economic development. In contrast, a dollar of NWC is worth much less than in other countries, in one case as little as US\$0.41. These results show the important role played by law enforcement and a country's economic development to reduce agency problems associated with firm liquidity.<sup>3</sup>

### Additional robustness

Our aim in this section is to give robustness to the results obtained from Model (1). First, we interact each dummy variable created in "Data" section with only the variable  $dNWC_{i,t}$  to determine whether the value of NWC depends on the investor protection and a country's financial and economic development. Specifically, we estimate the following model

$$\begin{aligned}
 V_{i,t} = & \beta_0 + \beta_1 E_{i,t} + \beta_2 dE_{i,t} + \beta_3 dE_{i,t+1} + \beta_4 dNA_{i,t} \\
 & + \beta_5 dNA_{i,t+1} + \beta_6 RD_{i,t} + \beta_7 dRD_{i,t} + \beta_8 dRD_{i,t+1} \\
 & + \beta_9 I_{i,t} + \beta_{10} dI_{i,t} + \beta_{11} dI_{i,t+1} + \beta_{12} D_{i,t} + \beta_{13} dD_{i,t} \\
 & + \beta_{14} dD_{i,t+1} + \beta_{15} dV_{i,t+1} + \beta_{16} dNWC_{i,t} + \beta_{18} dNWC_{i,t} \\
 & \times \text{Dummy} + \beta_{17} dNWC_{i,t+1} + \lambda_t + I_j + \varepsilon_{i,t}
 \end{aligned} \quad (2)$$

**Table 7.** Market value of NWC by investor protection variables.

	$E_{i,t}$	$dE_{i,t}$	$dE_{i,t+1}$	$dNA_{i,t}$	$dNA_{i,t+1}$	$RD_{i,t}$	$dRD_{i,t}$	$dRD_{i,t+1}$	$I_{i,t}$	$dI_{i,t}$	$dI_{i,t+1}$	$D_{i,t}$	$dD_{i,t}$	$dD_{i,t+1}$	$dV_{i,t+1}$	$dNWC_{i,t}$	$dNWC_{i,t+1}$	Intercept	Observations
<i>Full sample</i>	-0.0967*	0.7281*** (8.86)	1.7188*** (11.13)	0.9731*** (9.55)	0.9295*** (6.06)	0.5756*** (7.76)	-0.8236*** (-4.58)	-0.0246 (-0.27)	-4.1722*** (-3.78)	-6.3477*** (-6.01)	-11.9047*** (-5.98)	8.9943*** (20.27)	-0.9279* (-1.90)	4.0669*** (6.14)	-0.1507** (-1.96)	0.9740*** (6.54)	0.7683*** (4.50)	1.1633*** (22.62)	128,629
<i>Anti-self-dealing</i>																			
Low	0.0156 (0.25)	0.4507*** (6.31)	0.9469*** (5.71)	0.6672*** (3.37)	0.5805*** (3.26)	0.2906*** (3.27)	-0.5032*** (-2.61)	0.2431 (0.98)	-5.4879*** (-4.31)	-2.9787 (-1.53)	-6.9305** (-2.53)	9.6181*** (15.93)	-0.8158 (-1.14)	4.4632*** (4.63)	-0.1315 (-1.05)	0.7943*** (5.25)	0.8356*** (3.73)	1.2117*** (20.14)	24,471
High	-0.1272** (-2.13)	1.0031*** (7.59)	2.2827*** (11.38)	1.0258*** (11.22)	0.9687*** (6.55)	0.6504*** (8.59)	-0.8544*** (-4.27)	-0.0309 (-0.30)	-4.0015*** (-3.46)	-7.1382*** (-6.28)	-12.5422*** (-6.20)	9.8840*** (16.89)	-1.0913 (-1.59)	3.5001*** (5.44)	-0.1613** (-2.23)	0.9972*** (6.52)	0.7185*** (4.38)	1.1423*** (21.32)	104,158
<i>p value of difference</i>	.039**	.001***	0***	.050**	.004**	0***	.100*	.318	.227	.079*	.050**	.754	.801	.371	.715	.2177	.5260		
<i>Rule of law</i>																			
Low	0.2717*** (3.43)	0.5017*** (5.53)	0.9780*** (5.13)	0.4177*** (5.73)	0.6213*** (3.84)	0.5341*** (5.79)	-0.2625 (-1.46)	0.2873*** (2.02)	-1.1071 (-1.48)	-2.9673*** (-3.13)	-4.2473*** (-2.94)	9.3439*** (17.17)	-0.3932 (-0.40)	5.1499*** (4.12)	-0.2228* (-1.91)	0.5028*** (7.54)	0.6003*** (3.16)	0.9869*** (34.70)	31,778
High	-0.1991*** (-3.09)	0.8356*** (8.34)	2.0831*** (12.17)	1.1227*** (10.13)	1.0133*** (6.59)	0.5539*** (6.72)	-0.9111*** (-4.20)	-0.0787 (-0.78)	-4.0960*** (-3.45)	-8.2634*** (-6.98)	-13.4971*** (-6.24)	10.3518*** (16.73)	-1.0019 (-1.43)	3.9915*** (5.28)	-0.1543** (-2.07)	1.1778*** (6.21)	0.9024*** (4.96)	1.1742*** (22.34)	96,851
<i>p value of difference</i>	0***	.012**	0***	0***	.003**	.782	.055*	.045**	.008**	0***	0***	.271	.691	.447	.374	0***	.055*		
<i>Property rights</i>																			
Low	0.4555*** (3.33)	0.6533*** (5.89)	1.4426*** (5.49)	0.5016*** (6.52)	0.6872*** (4.65)	0.6222*** (6.91)	-0.2472 (-1.46)	0.4459*** (2.51)	1.2273 (1.49)	-4.5326*** (-4.02)	-5.4868*** (-3.10)	10.7627*** (14.53)	0.6628 (0.72)	6.9758*** (5.75)	-0.2859** (-2.49)	0.5702*** (9.44)	0.7272*** (3.97)	0.8876*** (27.07)	67,086
High	-0.3295*** (-7.87)	0.8085*** (8.64)	1.6667*** (9.69)	1.0513*** (8.99)	0.9784*** (6.26)	0.1862** (2.40)	-0.8748*** (-4.24)	-0.1286 (-1.45)	-10.2857*** (-9.58)	-5.4615*** (-4.75)	-14.9495*** (-7.13)	8.1640*** (13.55)	-1.6247** (-2.05)	2.2202*** (2.73)	-0.1316* (-1.85)	1.0337*** (6.36)	0.7539*** (5.13)	1.4436*** (27.83)	61,543
<i>p value of difference</i>	0***	.245	.416	0***	.036**	0***	.046**	.010**	0***	.372	0***	.035**	.141	.006**	.086*	.005**	.820		

Estimations using Fama-MacBeth (1973) regressions.  $V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus net operating working capital (NWC);  $RD$  is research and development expense;  $I$  is interest expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital.  $X_t$  is the level of variable  $X$  in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$ ;  $(X_t - X_{t-1})$  divided by assets in year  $t$ ;  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t+1$ ;  $(X_{t+1} - X_t)$  divided by assets in year  $t$ . *Antitself* measures the legal protection of minority shareholders against expropriation by insiders. *Rule of law* assesses the law and order tradition in the country. *Property rights* is an index of the protection of private property rights published. Time and industry dummies are included in the estimations but not reported; *t-statistic* in parentheses. The *p value of difference* indicates the *p* value for the differences in coefficients for compared regressions. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10%, respectively.



**Table 8.** Market value of NWC by investor protection variables.

	$E_{i,t}$	$dE_{i,t}$	$dE_{i,t+1}$	$dNA_{i,t}$	$dNA_{i,t+1}$	$RD_{i,t}$	$dRD_{i,t}$	$dRD_{i,t+1}$	$I_{i,t}$	$dI_{i,t}$	$dI_{i,t+1}$	$D_{i,t}$	$dD_{i,t}$	$dD_{i,t+1}$	$dV_{i,t+1}$	$dNWC_{i,t}$	$dNWC_{i,t+1}$	Intercept	Observations
Full sample	-0.2541*** (-4.79)	0.7284*** (8.18)	1.7321*** (7.53)	0.9978*** (11.68)	0.8860*** (6.00)	0.5083*** (7.04)	-0.6388*** (-4.30)	0.0752 (0.65)	-4.0738*** (-3.49)	-6.3171*** (-5.83)	-11.5080*** (-6.64)	9.7786*** (19.27)	-0.9488*** (-2.22)	3.8569*** (7.04)	-0.1188* (-1.79)	0.9940*** (6.92)	0.7986*** (4.23)	1.4220*** (64.56)	128,629
Anti-self-dealing																			
Low	-0.2114*** (-4.75)	0.5421*** (3.73)	1.0266*** (4.57)	0.6994*** (3.79)	0.6638*** (4.07)	0.1090 (1.03)	-0.3826** (-2.36)	0.2723* (1.89)	-6.5524*** (-5.10)	-2.0044 (-1.22)	-8.5028*** (-3.98)	9.2143*** (10.41)	-0.3641 (-0.54)	4.6440*** (5.55)	-0.1162 (-1.08)	0.9908*** (5.37)	0.8637*** (3.69)	1.4142*** (31.98)	24,471
High	-0.2400*** (-3.05)	0.9664*** (9.75)	2.2703*** (10.01)	1.0683*** (13.23)	0.9124*** (6.51)	0.5974*** (8.74)	-0.6769*** (-4.22)	0.0520 (0.42)	-3.9419*** (-3.12)	-7.3311*** (-5.64)	-12.5287*** (-6.80)	9.7265*** (17.62)	-1.2717* (-1.95)	3.2771*** (5.23)	-0.1266** (-2.06)	1.0024*** (6.77)	0.7611*** (4.13)	1.4119*** (64.73)	104,158
p value of difference	.755	.012***	0***	.030***	.005**	0***	.054*	.191	.056*	.008***	.068*	.600	.400	.884	.948	.948	.552	(64.73)	
Rule of law																			
Low	0.049 (0.99)	0.3507* (1.83)	0.9183*** (4.21)	0.5265*** (7.92)	0.5788*** (3.96)	0.3930*** (3.85)	-0.2061 (-1.58)	0.3494*** (2.80)	-2.0245** (-1.98)	-1.6996 (-1.62)	-3.9353*** (-4.21)	9.2036*** (13.01)	-0.6587 (-0.92)	4.1617*** (5.10)	-0.1344 (-1.35)	0.6463*** (8.12)	0.5946*** (4.05)	1.1607*** (22.36)	31,778
High	-0.3432*** (-5.82)	0.8730*** (9.82)	2.1242*** (9.00)	1.1576*** (12.19)	0.9671*** (6.46)	0.4955*** (6.53)	-0.7613*** (-4.37)	-0.0232 (-0.16)	-3.9012*** (-2.93)	-8.6832*** (-7.04)	-13.7443*** (-6.91)	10.3609*** (15.55)	-1.0155 (-1.38)	3.9762*** (4.94)	-0.1242** (-1.96)	1.2274*** (6.35)	0.9867*** (4.42)	1.2259*** (50.83)	96,851
p value of difference	0***	.003**	0***	0***	0***	.285	.006**	.049**	.129	0***	0***	.224	.777	.884	0***	0***	.011**	(50.83)	
Property rights																			
Low	0.0973 (1.50)	0.5473*** (4.67)	1.2241*** (4.59)	0.6074*** (6.85)	0.7382*** (4.87)	0.5834*** (5.46)	-0.1945 (-1.19)	0.3438** (2.29)	1.2541 (1.17)	-4.2221*** (-3.94)	-5.1500*** (-2.55)	11.6848*** (12.54)	0.5449 (0.64)	6.9665*** (6.95)	-0.1776* (-1.81)	0.6965*** (8.41)	0.7359*** (4.64)	1.1230*** (41.37)	67,086
High	-0.4609*** (-9.06)	0.8442*** (9.94)	1.5975*** (6.81)	1.0781*** (11.41)	0.8946*** (6.44)	0.0487 (0.81)	-0.7393*** (-4.74)	-0.0455 (-0.41)	-11.3146*** (-8.43)	-5.8075*** (-5.08)	-15.2935*** (-8.14)	7.7895*** (11.47)	-1.7103* (-1.99)	2.1856** (2.28)	-0.1046* (-1.77)	1.1113*** (6.68)	0.8653*** (4.64)	1.8703*** (52.20)	61,543
p value of difference	0***	.005**	.033**	0***	.151	0***	.012**	.028**	0***	.155	0***	.001***	.132	.002**	.338	.011**	.317	(52.20)	

Estimations clustering standard errors by both firm and time (Peterson, 2009).  $V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus net operating working capital (NWC);  $RD$  is research and development expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital.  $X_t$  is the level of variable  $X$  in year  $t$  divided by the level of assets in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t - 1$  to year  $t$  ( $X_t - X_{t-1}$ );  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t + 1$  ( $X_{t+1} - X_t$ );  $dX_{t+1}$  is the change in the level of  $X$  from year  $t - 1$  to year  $t$  ( $X_t - X_{t-1}$ );  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t + 1$  ( $X_{t+1} - X_t$ );  $dX_{t+1}$  is the change in the level of  $X$  from year  $t - 1$  to year  $t$  ( $X_t - X_{t-1}$ ).  $Property rights$  is an index of the protection of private property rights published. Time and industry dummies are included in the estimations but not reported;  $t$ -statistic in parentheses. The  $p$  value of difference indicates the  $p$  value for the differences in coefficients for compared regressions. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10%, respectively.

**Table 9.** Market value of NWC by financial and economic development.

	$E_{i,t}$	$dE_{i,t}$	$dE_{i,t+1}$	$dNA_{i,t}$	$dNA_{i,t+1}$	$RD_{i,t}$	$dRD_{i,t}$	$dRD_{i,t+1}$	$I_{i,t}$	$dI_{i,t}$	$dI_{i,t+1}$	$D_{i,t}$	$dD_{i,t}$	$dD_{i,t+1}$	$dV_{i,t+1}$	$dNWC_{i,t}$	$dNWC_{i,t+1}$	Intercept	Observations
<b>Stock market capitalization</b>																			
Low	0.2235*	0.3831*** (1.82)	0.8313*** (3.70)	0.5349** (2.50)	0.7832*** (5.82)	0.3477** (2.16)	-0.3145 (-1.35)	0.1748 (0.76)	-3.0424** (-3.53)	-0.5403 (-0.44)	-5.6920*** (-2.65)	7.5570*** (15.22)	-0.0659 (-0.09)	3.7644*** (4.96)	-0.2421* (-1.90)	0.5745*** (3.13)	0.7931*** (4.11)	1.1321*** (21.04)	19,408
High	-0.1559***	0.8740*** (8.74)	1.9388*** (11.58)	1.0335*** (10.83)	0.9506*** (6.21)	0.6098*** (8.99)	-0.8899*** (-4.57)	-0.0359 (-0.37)	-4.2919*** (-3.37)	-8.1367*** (-7.35)	-13.0119*** (-6.43)	10.3328*** (18.26)	-1.1299** (-1.97)	4.5334*** (5.39)	-0.1551** (-2.05)	1.0602*** (6.34)	0.7839*** (4.52)	1.1556*** (20.92)	109,221
<i>p</i> value of difference	.009**	.002**	0***	.025**	.111	.062*	.051*	.408	.326	0***	.001***	.002***	.261	.433	.386	.029**	.956		
<b>Private bond market capitalization</b>																			
Low	0.0131	0.5061*** (0.13)	1.5153*** (8.17)	0.7051*** (6.23)	0.6806*** (5.22)	0.6484*** (3.60)	-0.6856*** (-3.87)	0.2144 (1.58)	-4.6882** (-5.52)	-3.2719*** (-2.35)	-8.5885*** (-5.32)	9.0047*** (12.42)	-0.4963 (-0.52)	3.6226*** (4.12)	-0.1773* (-1.76)	0.7711*** (5.82)	0.5243*** (3.53)	1.1403*** (28.33)	31,854
High	-0.1316*	0.8130*** (8.39)	1.8530*** (10.41)	1.1032*** (9.34)	1.0061*** (6.21)	0.5663*** (10.03)	-0.8996*** (-3.97)	-0.0917 (-0.59)	-3.5183** (-3.08)	-8.2484** (-7.34)	-12.7299*** (-5.62)	11.1567*** (18.05)	-1.1261** (-2.64)	5.3415*** (6.12)	-0.1500** (-2.02)	1.0534*** (5.91)	0.8567*** (4.59)	1.1554*** (20.68)	96,282
<i>p</i> value of difference	.281	.024**	.070*	.001***	.006**	.585	.332	.253	.156	0***	.032**	.007***	.579	.026**	.640	.056*	.002**		
<b>GDP per capita</b>																			
Low	0.4270***	0.4247*** (3.55)	0.9311*** (5.15)	0.3868*** (4.64)	0.6173*** (4.06)	0.5989*** (5.63)	-0.1450 (-0.78)	0.3315*** (2.68)	-0.8791 (-1.35)	-2.2819*** (-2.46)	-3.8045*** (-3.48)	8.5773*** (15.99)	-0.3931 (-0.45)	4.4221*** (4.39)	-0.2451** (-2.04)	0.4198*** (7.07)	0.5605*** (2.96)	0.9653*** (30.39)	29,483
High	-0.2285***	0.8475*** (9.39)	2.0320*** (11.54)	1.1210*** (10.07)	1.0157*** (6.59)	0.5324*** (6.21)	-0.9472*** (-4.51)	-0.0981 (-0.99)	-3.9506** (-3.30)	-8.4881** (-7.04)	-13.1060*** (-5.87)	10.5544*** (18.90)	-1.0917* (-1.71)	4.2007*** (5.37)	-0.1588** (-2.11)	1.1908*** (6.44)	0.9245*** (5.09)	1.1756*** (22.79)	99,146
<i>p</i> value of difference	0***	.001***	0***	0***	.003**	.396	.019**	.010**	.004**	0***	0***	.031**	.608	.863	.341	0***	.031**		

Estimations using Fama-MacBeth (1973) regressions.  $V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus net operating working capital (NWC);  $RD$  is research and development expense;  $I$  is interest expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital.  $X_t$  is the level of variable  $X$  in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$ ;  $(X_t - X_{t-1})$  divided by assets in year  $t$ ;  $dX_{t+1}$  is the change in the level of  $X$  from year  $t$  to year  $t+1$ ;  $(X_{t+1} - X_t)$  divided by assets in year  $t$ . *Stock market cap* is the stock market capitalization to GDP. *Bond market cap* is the private bond market capitalization, *GDP per capita* is the gross domestic product per capita. Time and industry dummies are included in the estimations but not reported; *t*-statistic in parentheses. The *p* value of difference indicates the *p* value for the differences in coefficients for compared regressions. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10%, respectively.

**Table 10. Market value of NWC by financial and economic development.**

	$E_{i,t}$	$dE_{i,t}$	$dE_{i,t+1}$	$dNA_{i,t}$	$dNA_{i,t+1}$	$RD_{i,t}$	$dRD_{i,t}$	$dRD_{i,t+1}$	$I_{i,t}$	$dI_{i,t}$	$dI_{i,t+1}$	$D_{i,t}$	$dD_{i,t}$	$dD_{i,t+1}$	$dV_{i,t+1}$	$dNWC_{i,t}$	$dNWC_{i,t+1}$	Intercept	Observations
<i>Stock market capitalization</i>																			
Low	-0.1530*** (-2.97)	0.3787*** (2.88)	0.8180*** (3.76)	0.6768*** (3.43)	0.7273*** (5.40)	0.1747 (1.56)	-0.2633 (-1.33)	0.1694 (1.34)	-4.2026*** (-4.00)	0.1050 (0.09)	-5.5763*** (-3.00)	8.2508*** (9.64)	-0.7737 (-1.11)	3.6349*** (5.14)	-0.1432 (-1.51)	0.7947*** (5.65)	0.7820*** (3.60)	1.2825*** (26.33)	19,408
High	-0.2558*** (-3.83)	0.8438*** (8.81)	2.0392*** (8.74)	1.0687*** (12.27)	0.9037*** (6.01)	0.5591*** (7.92)	-0.7104*** (-4.46)	0.0679 (0.54)	-4.0912*** (-3.14)	-8.3968*** (-6.70)	-13.0597*** (-7.50)	10.0748*** (18.37)	-1.0234* (-1.78)	3.8111*** (5.89)	-0.1205* (-1.82)	1.0645*** (6.61)	0.8143*** (4.19)	1.4238*** (55.44)	109,221
<i>p value of difference</i>	.214	0***	0***	.041***	.042***	0	.037***	.488	.937	0***	0***	.048***	.799	.836	.758	.113	.855		
<i>Private bond market capitalization</i>																			
Low	-0.1730*** (-2.86)	0.4988*** (4.63)	1.2911*** (5.80)	0.7860*** (7.32)	0.7258*** (5.07)	0.3327*** (3.60)	-0.4273*** (-2.78)	0.3079* (1.82)	-5.7266*** (-5.78)	-2.5452* (-1.85)	-8.6570*** (-6.64)	8.6614*** (11.66)	-0.7071 (-0.83)	3.3928*** (4.15)	-0.1159 (-1.29)	0.9006*** (6.64)	0.6314*** (3.86)	1.3860*** (42.12)	31,854
High	-0.2943*** (-4.96)	0.8264*** (8.42)	1.9170*** (7.53)	1.0983*** (10.85)	0.9630*** (6.05)	0.5647*** (7.21)	-0.7377*** (-4.09)	-0.0205 (-0.12)	-3.2669*** (-2.56)	-8.8180*** (-7.64)	-13.0368*** (-6.21)	10.6802*** (16.84)	-0.8638* (-1.69)	4.6516*** (7.63)	-0.1234** (-1.99)	1.0269*** (6.26)	0.8908*** (4.16)	1.4038*** (49.11)	96,282
<i>p value of difference</i>	.039**	0***	0***	.008**	.016**	.015**	.107	.220	.014**	0***	.022**	.026**	.881	.146	.883	.270	.023**		
<i>GDP per capita</i>																			
Low	0.1110* (1.83)	0.2842 (1.49)	0.7781*** (4.00)	0.5408*** (6.62)	0.5820*** (4.11)	0.4510*** (4.42)	-0.1438 (-0.97)	0.3632*** (2.71)	-1.6401* (-1.79)	-1.2753 (-1.21)	-3.9691*** (-5.12)	8.7148*** (12.28)	-0.7575 (-1.18)	3.9488*** (4.57)	-0.1234 (-1.22)	0.5992*** (6.84)	0.5230*** (3.33)	1.1041*** (21.28)	29,483
High	-0.3448*** (-5.80)	0.8667*** (9.77)	2.0952*** (8.49)	1.1465*** (11.90)	0.9645*** (6.30)	0.4646*** (5.82)	-0.7769*** (-4.57)	-0.0399 (-0.27)	-3.8260*** (-2.86)	-8.7790*** (-7.05)	-13.2774*** (-6.49)	10.4454*** (16.79)	-0.9438 (-1.38)	3.9193*** (4.85)	-0.1258* (-1.93)	1.233*** (6.58)	1.0046*** (4.57)	1.2226*** (51.24)	99,146
<i>p value of difference</i>	0***	0***	0***	0	0	.887	.002**	.052*	.060*	0***	0***	.059*	.869	.982	.974	0***	.003**		

Estimations clustering standard errors by both firm and time (Peterson, 2009).  $V$  is the market value of the firm calculated as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt;  $E$  is earnings before interest and taxes;  $NA$  is total assets minus net operating working capital (NWC);  $RD$  is research and development expense;  $D$  is total common dividends paid; and  $NWC$  is the net investment in operating working capital.  $X_t$  is the level of variable  $X$  in year  $t$  divided by the level of assets in year  $t$ ;  $dX_t$  is the change in the level of  $X$  from year  $t-1$  to year  $t$ ;  $(X_t - X_{t-1})$  divided by assets in year  $t$ ;  $dX_{t-1}$  is the change in the level of  $X$  from year  $t$  to year  $t+1$  ( $X_{t+1} - X_t$ ) divided by assets in year  $t+1$ . *Stock market cap* is the stock market capitalization to GDP, *Bond market cap* is the private bond market capitalization, *GDP per capita* is the gross domestic product per capita. Time and industry dummies are included in the estimations but not reported;  $t$ -statistics in parentheses. The  $p$  value of difference indicates the  $p$  value for the differences in coefficients for compared regressions. \*\*\*, \*\*, and \* indicate statistical significance at 1%, 5%, and 10%, respectively.

Results obtained by using both the Fama–MacBeth (1973) estimation method and standard errors clustered by firm and year (Petersen, 2009) do not change. Second, we discuss statistical issues. In particular, we establish some assumptions about the variance–covariance matrix of the error terms. Although Fama and French (1998) and Pinkowitz et al. (2006) consider the Fama and MacBeth (1973) approach is appropriate to estimate regressions such as ours, we also allow for clustering by country and clustering by country and year. We find that the results are in line with those found when we estimated clustering by firm and year. We do not present the results of this section in a table, but they are available from the authors upon request.

## Conclusion

This study complements previous research on the value of investment in NWC. While previous studies are scarce and mainly focus on a single country, we analyze the valuation of NWC in an international setting. We use a sample of 30 countries for the period 1995–2013. We not only show that the value of NWC differs across countries but also how this valuation depends on the level of enforcement and a country's financial and economic development.

We find that shareholders assign a greater value to the NWC of companies in countries with stronger enforcement of the law and greater financial and economic development. According to the results, a dollar of NWC is worth roughly a dollar in these countries. In contrast, a one-dollar increase in NWC is valued with a discount in the other countries, being worth—in one case—as little as US\$0.41.

Our findings make valuable contributions to the current literature by revealing the important role that investor protection and a country's financial and economic development play in the value of NWC. The results not only enrich our knowledge of the value of NWC but also extend the existing literature on the legal environment and a country's financial and economic development. While previous research has demonstrated that these factors affect a firm's capital structure and valuation, as well as the value of cash holdings, our results show that they also influence the value of NWC. This evidence supports the importance of the institutional setting and its effect on financial decision making and valuation of financial policies.

Finally, since recent financial literature has pointed to the existence of a nonlinear relationship between NWC and firm value (Aktas et al., 2015; Ben-Nasr, 2016), it could be interesting to conduct further research focused on analyzing whether the impact of institutional setting on the value of NWC depends on the current level of NWC, that is, if this is high or low. Similarly, taking into account that related parties transactions are

commonly used to engage in tunneling activities, further research could also consider the presence of business groups and pyramidal ownership which are greater in those countries that provide lower levels of investor protection.

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## Notes

1. This valuation regression developed by Fama and French (1998) has been frequently used in the subsequent financial literature as in Pinkowitz et al. (2006), Drobetz et al. (2010), Haw et al. (2011), Kyröläinen et al. (2013), and Ben-Nasr (2016), among others.  $X_{t+1}$  variables are built with observed values.
2. The Appendix 1 provides a summary of all country-specific variables and data sources.
3. The results do not change when we exclude Japan, the country that presents the higher number of observations (40,509), or the 2007–2008 period.

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**Appendix I.** Description of country-specific variables and sources.

Name	Description	Source
<i>Antiself</i>	The anti-self-dealing index measures the legal protection of minority shareholders against expropriation by insiders. This index captures the regulation of firm self-dealing transactions along three dimensions: disclosure, approval procedures for transaction, and facilitation of private litigation when self-dealing is suspected. A higher score implies that the minority shareholders are better protected	Djankov et al. (2008)
<i>Rule of law</i>	Integrity of the legal system. This variable comes from the PRS Group's ICRG and assesses the law and order tradition in the country. This ranges from 0 to 6, with higher scores indicating greater efficiency of the legal system	International Country Risk Guide (ICRG)
<i>Property rights</i>	This index measures the protection of property rights and ranges between 0 and 100, with higher scores indicating greater legal protection of property rights	Heritage Foundation
<i>Stock market cap</i>	The stock market capitalization to GDP ratio. This is a measure of stock market development. We use the mean value for the period 1995–2013	Financial Development and Structure Database (World Bank)
<i>Bond market cap</i>	The private bond market capitalization to GDP ratio. This is a measure of bond market development. We use the mean value for the period 1995–2013	Financial Development and Structure Database (World Bank)
<i>GDP per capita</i>	The GDP per capita (US\$). We use the mean value for the period 1995–2013	World Development Indicators (World Bank)

ICRG: International Country Risk Guide; GDP: gross domestic product.