DEUTSCHE
BUNDESBANK
EUROSYSTEM

Does lowering dividend tax rates increase dividends repatriated? Evidence of intra-firm cross-border dividend repatriation policies by German multinational enterprises

Christian Bellak
(Vienna University of Economics and Business Administration)

Markus Leibrecht
(Vienna University of Economics and Business Administration)

Michael Wild
(Vienna University of Economics and Business Administration)

Discussion Paper
Series 1: Economic Studies
No 19/2009

Deutsche Bundesbank, Wilhelm-Epstein-Strasse 14, 60431 Frankfurt am Main,
Postfach 10 06 02, 60006 Frankfurt am Main

Tel +49 69 9566-0
Telex within Germany 41227, telex from abroad 414431

Please address all orders in writing to: Deutsche Bundesbank,
Press and Public Relations Division, at the above address or via fax +49 69 9566-3077

Internet http://www.bundesbank.de

ISBN 978-3–86558–536–3 (Printversion)
ISBN 978-3–86558–537–0 (Internetversion)

Does lowering dividend tax rates increase dividends repatriated? Evidence of intra-firm cross-border dividend repatriation policies by German Multinational Enterprises*

Markus Leibrecht† Christian Bellak‡ Michael Wild§

Abstract

This paper explores the impact dividend taxes exert on the dividends repatriated from foreign affiliates to their German parent company. Based on an augmented Lintner model of firms' dividend payout decisions, the paper focusses on cross-border intra-firm dividend payments of wholly-owned foreign affiliates in the manufacturing sector. Firm-level data from the Microdatabase Direct Investment (MiDi) of the Deutsche Bundesbank is used. Results firstly signal the validity of the original Lintner model for cross-border intra-firm dividend payments of German affiliates abroad, although the target payout ratio and the degree of dividend smoothing drops substantially once time-invariant unobserved heterogeneity is controlled for. Secondly, results from an augmented Lintner model imply that increases in dividend taxes indeed have a statistically significant negative impact on the expected value of dividends repatriated: Evaluated at the overall mean dividend payment a one percentage point increase in the dividend tax rate would decrease dividends repatriated by about 3.5 percent. Evaluated at the mean of positive dividend payments a semi-elasticity of -1.6 is derived.

Keywords: Dividend Policy, Taxes, Lintner Model, Multinational Enterprise

JEL codes: G35, H25

*This research was supported by a grant from the Austrian Science Fund. Comments by Rosanne Altshuler, Dhammika Dharmapala, Mike Devereux, Heinz Herrmann, Alexander Lipponer, Beatrix Stejskal-Passler, Alfons Weichenrieder and of seminar participants in Nottingham, Perugia, Reading, Vienna and the NTA Annual Conference (Boston) are highly appreciated. The hospitality of the research center of the Deutsche Bundesbank is gratefully acknowledged.

†Vienna University of Economics and Business, Department of Economics and Research Institute for International Taxation, Augasse 2 - 6, A-1090 Vienna, Austria, Phone (+43-1) 313 36-5833, e-mail: leibrecht@wu.ac.at.

‡Corresponding author; Vienna University of Economics and Business, Department of Economics, Augasse 2 - 6, A-1090 Vienna, Austria, Phone (+43-1) 313 36-4505, e-mail: bellak@wu.ac.at.

§Vienna University of Economics and Business, Department of Economics and Research Institute for International Taxation, Augasse 2 - 6, A-1090 Vienna, Austria, Phone (+43-1) 313 36-5931, e-mail: wild@wu.ac.at.

Non technical summary

The aim of this study is to analyse whether dividend taxes exert a statistically and economically relevant impact on the expected value of dividends repatriated from foreign affiliates to their German parent company over the 1999-2005 period. The paper contributes to the literature as evidence on the impact dividend taxes have on cross-border intra-firm dividend payments is rather scarce. This is especially the case for countries applying the exemption system in international taxation, like Germany.

The analysis is based on data provided by the Deutsche Bundesbank's Microdatabase Direct Investment (MiDi) database. Specifically, data on German foreign affiliates in the manufacturing sector which are directly and wholly-owned by a German parent company is used for the analysis. Host countries included are the EU member countries (as of 2007) and the most advanced Non-EU OECD countries. In total, information contained in yearly data on 587 German affiliates abroad over 7 years is explored.

The analysis is based on the widely known Lintner model of dividend smoothing, which is frequently seen as a relevant description of firms' dividend payout behavior. The Lintner model is a partial adjustment model suggesting that firms have a target dividend payment, which is a fraction of its current earnings. The model leads to an empirical specification relating dividends paid to lagged dividends and current earnings of the firm. However, the basic Lintner model has been established for dividend payments to public shareholders, but not the intra-firm case and moreover it does not include taxes as determinants of dividend payments. Thus, two issues prior to exploring the tax effect within the Lintner framework arise: (i) it has to be established that the basic Lintner model also is suitable to analyze cross-border intra-firm payout behavior; and (ii) the Lintner model has to be augmented to include taxes as determinants of dividend payments.

Empirical analysis of the basic Lintner model implies that this model seems to be valid for analysing cross-border intra-firm dividend payments, even if emphasis is put on the isolation of "true state dependence" in payout behavior. The existence of "true state dependence" implies that payment of dividends in earlier years has a genuine behavioural effect on future dividend policy, as suggested by the Lintner model. Yet, compared to studies analysing the public shareholder sphere, the target-payout ratio is lower and the speed of adjustment is higher in the intra-firm context. From a more substantive perspective these differences are in line with the theoretical view suggesting that dividend payments are less relevant for signalling and controlling (agency) aims in the parent-subsidiary sphere.

Concerning the second issue raised, the basic Lintner model is augmented in a way that the target dividend payment is not merely a fraction of the firm's current earnings but also depends on other factors like the taxation of dividends paid, the firm size or the debt level of the affiliate. Estimating empirically the augmented Lintner model reveals that taxes do play a signif-

icant role for the repatriation behavior. In particular, the results imply that a one percentage point decrease in the dividend tax rate would result in a 3.5 (1.6) percent increase in dividends repatriated if the coefficients derived are evaluated at the overall mean value of dividend payments (mean value of positive dividend payments).

Nicht technische Zusammenfassung

Diese Studie untersucht, ob Dividendensteuern sowohl aus statistischischer als auch aus ökonomischer Sicht eine relevante Wirkung auf das Volumen von nach Deutschland repatriierten Dividenden haben. Bisher liegt kaum empirische Evidenz über den Einfluss von Dividendensteuern auf intra-Firmen Dividendenzahlungen über die Grenze vor. Dies ist insbesondere für Länder wie Deutschland der Fall, welche das Freistellungsverfahren in der Internationalen Besteuerung anwenden. Die Analyse stützt sich auf Daten aus der "Microdatabase Direct Investment" (MiDi) der Deutschen Bundesbank. Es werden in der Analyse Daten über direkte Deutsche Tochtergesellschaften des verarbeitenden Sektors im Ausland verwendet, welche zu hundert Prozent im Eigentum einer Deutschen Muttergesellschaft stehen. Als Gastländer werden alle EU Mitgliedstaaten mit Stand 2007, sowie die höchstentwickelten nicht-EU OECD Länder inkludiert. Insgesamt wird Information aus jährlichen Daten über 587 Deutsche Tochterunternehmen im Ausland über sieben Jahre (1999 - 2005) verwendet.
Die Analyse stützt sich auf das Lintner Modell der Dividendenpolitik, welches die Dividendenzahlungen eines Unternehmens in Abhängigkeit der laufenden Gewinne und früherer Dividendenzahlungen analysiert. Das Lintner Modell ist ein partielles Anpassungsmodell, welches impliziert, dass Unternehmen einen bestimmten Anteil des Gewinnes als Dividendenzahlung anstreben. Dieses Modell resultiert in einer empirischen Spezifikation, welche die gezahlte Dividende zu den im Vorjahr gezahlten Dividenden und den laufenden Gewinnen und Verlusten in Beziehung setzt. Nachdem das Lintner Modell für die Erklärung von Dividendenzahlungen an individuelle Anteilseigner entwickelt wurde, nicht aber für intra-Firmen Dividendenzahlungen und es zudem Steuern als Determinanten von Dividendenzahlungen nicht enthält, müssen bevor der Effekt von Steuern mithilfe des Lintner Modells analysiert werden kann zwei Punkte geklärt werden: Erstens muss festgestellt werden, ob das ursprüngliche Lintner Modell auch für die Analyse des Dividendenzahlungsverhaltens im grenzüberschreitenden intra-Firmen Kontext geeignet ist. Zweitens muss das Lintner Modell um Steuern als Determinanten von Dividendenzahlungen erweitert werden.
Die empirische Analyse zeigt, dass das Lintner Modell geeignet ist, um das Dividendenzahlungsverhalten im grenzß"uberschreitenden intra-Firmen Kontext zu analysieren, sogar wenn Pfadabhängigkeit in der Dividendenpolitik explizit berücksichtigt wird. Pfadabhängigkeit impliziert, dass Dividendenzahlungen in früheren Jahren eine direkte Auswirkung auf zukünftige Dividendenzahlungen haben, wie es das Lintner Modell vorhersagt. Jedoch zeigt sich, dass im Vergleich mit den Ergebnissen von Studien in Bezug auf individuelle Anteilseigner die Anpassungsgeschwindigkeit höher ist. Dieser Unterschied ist konsistent mit theoretischen Modellen, welche eine geringe Relevanz von Dividendenzahlungen zum Zweck des Signalisierens (signalling) und der Kontrolle (agency) im Mutter-Tochter Zusam-

menhang aufzeigen.
Um dem zweiten Punkt Rechnung zu tragen, wird das Lintner Modell erweitert, so dass die angestrebte Dividendenzahlung nicht nur eine Funktion des Gewinnes (Verlustes) ist, sondern auch von anderen Faktoren, wie zum Beispiel der Besteuerung der ausgeschütteten Dividende, der Unternehmensgröße oder dem Verschuldungsgrad der Auslandstochter abhängt.
Die empirische Schätzung des erweiterten Lintner Modells ergibt, dass Steuern eine signifikante Rolle für das Repatriierungsverhalten spielen.
Die Ergebnisse der empirischjen Analyse implizieren, dass eine Senkung des Dividendensteuersatzes um einen Prozentpunkt zu einer Steigerung der repatriierten Dividende um 3.5 (1.6) Prozent führen würde, wenn die Regressionskoeffizienten am Mittelwert der gezahlten Dividende (am Mittelwert der Dividenden mit positiven Euro-Wert) evaluiert werden.

Contents

1 Introduction

Dividend repatriations of foreign affiliates to domestic parent companies and their determinants, respectively, are an important topic, both from micro- and macroeconomic viewpoints (e.g. Altshuler and Grubert, 2002). From the micro-perspective the choice of whether to repatriate earnings from a foreign subsidiary is a relevant decision in multinational financial management. From the macroeconomic viewpoint, the timing and extent of dividend repatriation may have direct consequences for the level of tax revenues, employment and investment in the home and the host country of Foreign Direct Investment (FDI). Thus, if dividend taxes significantly determine firms' repatriation policies, they may also be directly connected with micro- and macroeconomic consequences.

It is a stylized fact that high dividend taxes reduce dividends paid (see Gordon and Dietz, 2006). This tax effect is predominantly established in studies dealing with dividend payments to public shareholders. In contrast, evidence on the impact dividend taxes have on cross-border intra-firm dividend payments is rather scarce, even though some evidence is available for credit system countries, the US in particular. Evidence for exemption system countries, like Germany[1], is even scarcer. However, even in the latter case dividend taxes may impact on the volume of dividends repatriated as, for instance, host countries of FDI might levy withholding taxes on repatriated profits.

This paper analyzes the impact dividend taxes exert on the dividends repatriated from foreign affiliates to their German parent company. The effect dividend taxes have on intra-firm cross-border dividend repatriation policies can be analyzed by a new and powerful dataset, namely the Microdatabase Direct Investment (MiDi) provided by the Deutsche Bundesbank. This database includes firm-level data of German parent companies and their affiliates abroad. Specifically, based on the Lintner model of firms' dividend payout decisions (see Lintner, 1956) the paper focusses on the cross-border dividend payments of wholly-owned foreign affiliates (direct participating interests, Lipponer, 2008) in the manufacturing sector to their parent company in Germany.

The analysis is based on the Lintner model, as this model is consistent with a second empirical stylized fact about firms' dividend decisions, namely the dividend smoothing behavior of firms (see e.g. Gordon and Dietz, 2006). Moreover this model is frequently seen as "the best description of the dividend setting process available." (Benartzi et al., 1997, p. 1032) It has to be noted, however, that the original intention of the Lintner model was not to explain cross-border intra-firm dividend payments. Rather, the focus was

[1] Germany effectively applies the exemption system also prior to 2001 by exempting dividends via double tax treaties and having an extensive treaty network (see Grubert, 2001).

to describe dividend payments of firms to public shareholders. Additionally, the "basic" Lintner model does not directly contain taxes as a possible determinant of dividend policy. Thus, two issues arise: Firstly, the empirical relevance of the Lintner model for the specific dividend payment decision considered in this paper has to be explored. Secondly, the basic Lintner model has to be augmented to capture the impact of dividend taxes on the expected value of dividend payments.

With respect to the first issue raised, we find that the Lintner model is indeed suitable for analyzing cross-border intra-firm dividend payments, although the target payout ratio and the degree of dividend smoothing are relatively low and the adjustment to the target payout ratio occurs rather quickly. Yet, one has to bear in mind that our analysis also shows that the expected value of dividends remitted is higher for firms that initially pay a higher dividend. Based on an "augmented" Lintner model we find that, besides the variables stressed by Lintner and the initial dividend payment, taxes as well as an affiliate's indebtedness and size significantly determine dividend repatriation decisions. Specifically, the results imply that a one percentage point decrease in the dividend tax rate would increase dividends repatriated by 3.5 percent if evaluated at the overall mean dividend payment (semi-elasticity of about -3.5). Evaluated at the mean of positive dividend payments a semi-elasticity of -1.6 is derived. These results are broadly comparable to the values derived by prior studies focusing on Multinational Enterprises (MNEs) from the US.

The paper is structured as follows: Section two outlines the basic Lintner model and provides an overview of studies analyzing its empirical relevance. Further, section two includes some methodological considerations for analyzing dividend decisions and it elaborates on the usefulness of the basic Lintner model for analyzing the cross-border intra-firm dividend decisions of German companies. Section three presents results from the estimation of an augmented Lintner model which also captures various additional determinants of firms' dividend policies, notably dividend taxes. The augmented Lintner model is thereby introduced, and the results of related literature as well as the regression results are presented. Section four summarizes.

2 The basic Lintner model

2.1 The model framework

The basic Lintner model is essentially a "partial adjustment model". Thus, the model begins with the following equation describing dividend payments (based on Lintner, 1956, p. 107):

$$\Delta DIV_{it} = d(DIV_{it}^{*} - DIV_{it-1}) + \epsilon_{it} \tag{1}$$

with: i = firm i, t = year, d = speed of adjustment coefficient, DIV_{it} = dividend payment of firm i in year t, DIV_{it}^{*} = desired (long-run) dividend payment, ϵ_{it} = error term.

In a panel context, the error-term is written as $\epsilon_{it} = c_i + \rho_t + \vartheta_{it}$ with ρ_t being time-specific effects usually modeled as time dummies, c_i are (random or fixed) firm-specific time invariant effects and ϑ_{it} is the remainder error term. Substituting DIV_{it}^{*} by $rProfit_{it}$ with $Profit_{it}$ being the current year's earnings after taxes of the firm and $1 \geq r > 0$ being the desired long-run target payout ratio and rearranging gives

$$DIV_{it} = drProfit_{it} + (1-d)DIV_{it-1} + \epsilon_{it} \tag{2}$$

The most important implications of the Lintner model given in Equation (1) and Equation (2) can be summarized as follows (based on Marsh and Merton, 1987; Bessler and Ellermann, 2004):

1. After tax earnings are the most important determinant of dividends.
   Recursively solving Equation (2) shows that current and past values of $Profit_{it}$ are the main determinants of dividends.

2. Firms' managers focus on dividend changes.
   This is directly derivable from Equation (1). Lintner (1956) formulates his model in this way. Yet he conducts his empirical analysis based on Equation (2).

3. Firms have a desired, long-run payout ratio (r).
   This implies that r derivable from Equation (2) is significantly different from zero.

4. Firms smooth dividend payments.
   Dividend changes follow shifts in earnings, yet due to technological, institutional and psychological inertia, firms will smooth dividends. In other words, the level of dividends paid in $t-1$ has an impact on dividends paid in t.[2]

2.2 Survey of existing studies applying the basic Lintner model

We have separated the empirical studies using the basic Lintner model into two categories: the first deals with the dividend payout in general, mainly involving dividends paid to public shareholders, and the second specifically

[2] A number of theoretical models explain why firms smooth dividends. Among them are signalling and agency models. The first sees dividends as a means for managers to signal "true profitability" to shareholders and the latter argues that the board of directors requires dividend payments as a device to control selfish managers (see Gordon and Dietz, 2006).

concerns cross-border intra-firm dividend payments. The former papers are further detailed into early studies, including the seminal work of Lintner, recent studies and studies dealing with German firms. We provide three measures to characterize the studies: the estimated long-run payout ratio (r), the speed of adjustment coefficient (d) and the median adjustment lag (δ). The latter shows the time period necessary to close the gap between the actual and the target dividend payment by 50 percent after a disequilibrating shock has occurred.[3] Table (1) in the appendix shows the results derived.[4]

2.2.1 Public shareholder sphere

Lintner (1956) uses aggregate data from national accounts. He reports a speed of adjustment coefficient of 30 percent and a target payout ratio of 50 percent. The median adjustment lag is about two years. These results are only slightly altered in the study of Fama and Babiak (1968, p. 1134 Panel A), using firm-level data in order to better reflect the individual firm decision. Brittain (1964) provides another set of results by generalizing Lintner's model via introducing depreciation allowances, personal income tax rates on dividends and other explanatory variables, based on aggregated data (38 annual observations 1920-1960, excluding 1936-38). The results of Brittain differ markedly from the average reported in Table (1), as the speed of adjustment is rather low (0.15) and the averaged long-run payout ratio is the highest of all studies surveyed (0.90).

Recent studies are those of Van Eije and Megginson (2008), who use Data-Stream and Worldscope firm-level data with a focus on European countries and Skinner (2008), who uses data on US firms from Compustat. Van Eije and Megginson (2008) report a higher speed of adjustment coefficient and a target payout ratio comparable to that of the Lintner benchmark. Skinner (2008) reports a markedly lower speed of adjustment coefficient and thus a higher median adjustment lag (see Table (1)).

Studies based on German firm-level data are Behm and Zimmermann (1993), Da Silva et al. (2004) and Andres et al. (2009). Behm and Zimmermann (1993) use data on 32 major German firms between 1962 and 1988. While the speed of adjustment is much lower than Lintner's, the averaged long-run payout ratio is almost equal. Da Silva et al. (2004) use data on 221 listed firms in Germany for the period 1984-93, for which at least five years of accounting data exist. They find a slightly lower speed of adjustment than Lintner (1956), but a similar payout ratio. Andres et al. (2009)

[3]The median adjustment lag (δ) is calculated as $(ln(0.5)/ln(1-d))$ (see Pindyck and Rubinfeld, 1998).

[4]Most studies focus on the US and other highly developed OECD countries. With respect to other countries, for example Glen et al. (1995) found that the speed of adjustment lies between 40 percent in Zimbabwe and 90 percent in Turkey and the target payout ratios are between 30 and 40 percent. Adaoglu (2000) points out a speed of adjustment of 100 percent in Turkey with a payout ratio of 50 percent.

use data on 220 industrial and commercial firms in Germany. In particular, their finding points to a more flexible dividend policy as firms are willing to cut the dividend when profitability is only temporarily down. The results of Andres et al. (2009) are consistent with a lower degree of dividend smoothing of German firms compared to firms from the US or the UK.

2.2.2 Cross-border intra-firm sphere

The Lintner model is also used to model cross-border intra-firm dividends. Two studies (Desai et al., 2001, 2006) are based on firm-level data (data on dividends repatriated from US affiliates abroad). A third study (Lehmann and Mody, 2004) uses data from current accounts and analyzes inter alia aggregate dividend payments from abroad to Germany. Compared to the results for dividends paid to public shareholders, the speed of adjustment coefficients of these studies are much higher, and therefore the median adjustment lags are lower. Thus, these results imply that dividend smoothing is not as relevant in the cross-border intra-firm case as it is for the public shareholder sphere.[5]

Whereas Desai et al. (2001, 2006) report target payout ratios which are comparable to those reported for dividend payments to public shareholders, the target payout ratio derived by Lehmann and Mody (2004) is virtually zero. Hence, only the results derived by Desai et al. (2001, 2006) favor the validity of the Lintner model for the cross-border intra-firm dividend case.

Overall, the empirical studies reported in Table (1) are in favor of the Lintner model. However, smoothing seems to be much more important for the public shareholder sphere than for cross-border intra-firm dividend payments. Nevertheless, our summary of results also implies considerable heterogeneity between studies, especially concerning the speed of adjustment and hence the median adjustment lags.

It must be noted that the studies included in Table (1) are based on the linear OLS estimator. Yet, as dividend payments of an individual firm cannot be negative, the dependent variable is left censored. Using the OLS estimator for *firm-level* data therefore probably leads to inconsistent estimates, as the conditional expectation of the model is non-linear in the parameters and the regressors (see Wooldridge, 2002, p. 525). Hence, an estimator for censored and corner-solution data, the Tobit estimator, is better suited for testing the Lintner hypothesis of dividend smoothing in these cases. Indeed, the study of Desai et al. (2001) also applies this estimator and finds a speed of adjustment coefficient of 0.67 / 0.77 and a target payout ratio of 0.88 / 0.37.

[5] Among the early papers applying the Lintner model in the cross-border intra-firm context is Scaperlanda and Mauer (1972). According to Hines and Hubbard (1990), Scaperlanda and Mauer also find much higher speeds of adjustment than found in studies for payouts to public shareholders.

2.3 Relevance of the basic Lintner model for cross-border intra-firm dividend payments of German firms

2.3.1 Methodological considerations

As previously outlined, persistence in dividend payments is a crucial feature of the Lintner model. More specifically, the Lintner model postulates what can be called "true state dependence" in terms of Heckman (1981a, p. 91ff). Thus, the payment of dividends in year t_0 has a genuine behavioral effect on future dividend policy in the sense that an otherwise equal firm which does not pay a dividend in year t_0 will behave differently in the future. The coefficient on the lagged dividend variable in the Lintner model is intended to isolate true state dependence and to signal the extent of dividend smoothing behavior of firms.

Yet, firms' dividend policies also differ due to firm-specific, unobserved heterogeneity. In particular, for firm-specific reasons not related to the behavioral smoothing effect postulated by Lintner, firms pay (or do not pay) dividends. In this case, past dividend payments have no effect on the probability of paying dividends in the future (Baltagi, 2008, p. 217) and thus they are not part of an equation modelling dividend payments. Rather, the effect is captured by firm-specific time invariant effects.

Panel data allow us to include both a lagged dependent variable capturing the behavioral effect, as well as unobserved heterogeneity (i.e. firm-specific time invariant effects) in the same empirical model. Loudermilk (2007) stresses that unobserved affiliate-level heterogeneity is potentially important in explaining repatriated dividends. If one does not control for this unobserved heterogeneity - that is, by using a pooled estimator instead of a panel data estimator, the lagged dividend variable in the Lintner model acts as a proxy for such unobserved effects. An upward bias in the effect of the lagged dependent variable arises (see Hsiao, 2003, p. 218ff for examples). Improper treatment of unobserved heterogeneity gives rise to a relationship between past and future dividend payments which is "spurious" ("spurious state dependence") in terms of Heckman (1981a). In this case a significant (and positive) effect of the lagged endogenous variable in the Lintner model may not be related to behavioral dividend smoothing as postulated by Lintner (1956). Thus, neglecting unobserved affiliate-level heterogeneity results in a biased estimate of the degree of dividend smoothing.[6]

[6]So far, only a few empirical studies have attempted to examine the influence of modelling firm-specific, unobserved heterogeneity on the degree of smoothing behavior in the Lintner model. A notable exception is Loudermilk (2007). She examines the determination of the share of payouts to firms' shareholders made as share repurchases versus traditional cash dividends within the Lintner framework. In doing so, she explicitly models the impact of unobserved heterogeneity on the coefficient of the lagged dependent variable. Moreover, dealing with firms' dividend policies, Benito and Young (2003) also stress the importance of modelling unobserved heterogeneity. They analyze the incidence of dividend omissions and cuts as functions of financial characteristics including cash flow,

Several approaches are proposed in the literature to estimate dynamic non-linear panel data models with firm-specific unobserved heterogeneity. One crucial point therein is to cope with the "initial conditions problem", which occurs when the first period for which we observe an outcome is not the beginning of the underlying stochastic process (Benito and Young, 2003, p. 542). However, presample information might determine the observed in-sample values of the endogenous variable. This issue is aggravated if the initial condition is correlated with the time invariant firm-specific effects. Then, it is important to model the relationship of the initial condition (DIV_{it_0}) with the firm-specific time invariant effects (c_i). A first approach is to consider the DIV_{it_0} as uncorrelated with c_i. Yet, this assumption basically implies that DIV_{it_0} is exogenously given and fixed, which might not be the case. A second approach, which models DIV_{it_0} as correlated with c_i, is to approximate, for example via a Probit model, the conditional distribution of DIV_{it_0} given c_i and the exogenous variables (Heckman, 1981b). A third approach is to model c_i as a function of DIV_{it_0} and the exogenous variables (Wooldridge, 2005). The latter approach has the advantage of being applicable to corner-solution problems. Thus, in this study we apply this estimator.[7] Specifically, we estimate the following corner-solution model (see Wooldridge, 2002, p. 542f):[8]

$$DIV_{it} = max(0, drProfit_{it} + (1-d)DIV_{it-1} + \epsilon_{it}) \tag{3}$$

with: $\epsilon_{it} = c_i + \rho_t + \vartheta_{it}$ and $\vartheta_{it} \approx Normal(0, \sigma^2_\vartheta)$, t = 1,. . . ,T. As mentioned, the initial conditions problem is handled by specifying a distribution for c_i given DIV_{it_0} and the exogenous variables. Thereby either the "Chamberlain-approach" (Equation (4)) or the "Mundlak-approach" (Equation (5)) may be applied. The first approach models c_i as a function of DIV_{it_0} and of all exogenous explanatory variables across all time periods. The second approach includes the time average of all exogenous explanatory variables together with DIV_{it_0} (see Wooldridge, 2005; Wooldridge, 2002, p. 487).

$$\frac{c}{DIV_{it_0}, Profit; \theta} = a + bDIV_{it_0} + mProfit_i + \alpha_i \tag{4}$$

with $\alpha_i \approx Normal(0, \sigma^2_\alpha)$.

$$\frac{c}{DIV_{it_0}, Profit; \theta} = a + bDIV_{it_0} + mp_{i.} + \alpha_i \tag{5}$$

with $p_{i.} = 1/T \sum_{t=1}^{T} Profit_{it}$.

leverage, investment opportunities, investment and company size.

[7] The approach of Heckman (1981b) is for binary endogenous variables.

[8] The definitions of variables included in Equation (3) are the same as those in section (2.1).

In both cases, coefficients of time-constant exogenous variables, like country dummies, are not identified if included in Equation (4) or Equation (5) as well as in Equation (3) (Wooldridge, 2005, p. 44). Substitution of c_i in Equation (3) by the right side of Equation (4) or Equation (5) gives the corner-solution model which can be estimated by a standard random effects Tobit estimator. These estimates thus control for firm-specific unobserved effects and measure inter alia how within-firm changes in current earnings impact on dividends paid, given the level of lagged dividends paid (also see Chauvin and Kraay, 2007).

The Wooldridge (2005) estimator has the advantage of allowing the calculation of Average Partial Effects (APEs) from the estimated Tobit-coefficients. As argued by Wooldridge (2002) or Loudermilk (2007) in the case of corner-solution applications - such as, for example, the repatriation decision of foreign affiliates, the Tobit coefficient is not the parameter of interest.[9] Rather, for an economic interpretation of the estimates one should derive APEs which are better suited for evaluating the economic importance of variables. In particular, APEs can be derived from the Tobit coefficients following the procedure given in Wooldridge (2005, p. 49f). For continuous variables, this results in summing the partial effect variable x_l has on the dependent variable over all cross-sections (see also Wooldridge, 2002, p. 523 and 541ff):

$$APE_l = \sum_{i=1}^{N} \phi(\frac{x^0\beta}{\sigma})\beta_l \tag{6}$$

with: ϕ being the cumulative normal distribution function, x^0 being the matrix of regressors evaluated at the mean values, β being the vector of Tobit estimates and β_l being the Tobit estimate for regressor l; $\sigma = (\sigma_\vartheta^2 + \sigma_\alpha^2)^{1/2}$.

Note, that for the pooled Tobit estimator, which neglects the presence of c_i, the APE is equal to the partial effect, i.e it is equal to $\Delta E(y)/\Delta x_l$ evaluated at a suitable (mean) value of x_l (see Wooldridge, 2002, p. 24 and p. 530). Standard errors of the APEs can be derived using the "delta method" or a "bootstrapping approach" (Wooldridge, 2002, p. 495).

It should be noted that the Wooldridge estimator requires a balanced panel (Wooldridge, 2005, p. 42f; Poggi, 2007). Yet, as in the case of using an unbalanced panel, applying a balanced sub-panel might lead to a selection bias of the estimates. A simple procedure to give an indication of the likelihood of a selection bias is to compare estimates derived from the balanced panel with those derived from the unbalanced panel. If different results are derived, this is an indication of the presence of selection bias

[9] Corner solution problems where the mass point is due to maximization behavior have to be separated from censored data problems where the mass point is due to sampling. These two problems have different conditional expectations of interest (see Wooldridge, 2002, chapter 16).

(Verbeek, 2008, p. 178f).

To analyze the relevance of the Lintner model for dividend payments to German parent companies from their wholly-owned foreign affiliates we apply both the pooled Tobit estimator and the Wooldridge (2005) estimator for dynamic Tobit models. With respect to the latter estimator we generate a balanced panel of dividend payments in the years 1999 to 2005. Differences in the results concerning the effect of the lagged dependent variable using the pooled estimator and the Wooldridge estimator on the balanced estimator are an indication of the upward bias of the degree of dividend smoothing due to neglected, unobserved firm-specific heterogeneity. As already mentioned, markedly different results between the pooled Tobit estimates for the balanced and the unbalanced panel would point towards the presence of sample selection problems.[10]

2.3.2 Dividend data

This study is based on the MiDi database made available by the Deutsche Bundesbank (e.g. Lipponer, 2008). Although the MiDi database does not directly provide figures for dividends paid by affiliates abroad to their German parents, it provides sufficient information to allow the calculation of dividend payments according to the rules of the "Deutsches Handelsgesetzbuch" (HGB; German Code of Commercial Law). German parent companies have to deliver inter alia balance sheet data to the MiDi database according to HGB standards.[11] The method of dividend calculation applied here therefore follows HGB standards. Dividends repatriated in year t are proxied as follows[12]:

profit or loss for the financial year (after taxes and prior to profit distribution and offsetting of losses carried forward)[13] in t [p32]

\+ profit or loss carried forward from t-1 to t [p31]

[10] All estimators are implemented using Stata version 10.0 (tobit and xttobit commands). Partial effects for the pooled Tobit estimator are derived using Stata 8.0 and the dtobit command.

[11] The form which is sent to the German parent firms includes the following statement: "The reported figures must be based on the balance sheet according to the rules of the country of residence of the affiliate, prior to the allocation of the net income. ... Concerning the allocation of the balance sheet items in the form, the definitions and the classifications for the balance sheet of a German joint stock company have to be applied in an analogous way." (Source: Anlage K3 zur AWV, Blatt 2; Vermoegen Gebietsansaessiger in fremden Wirtschaftsgebieten, Deutsche Bundesbank. Translated by the authors.)

[12] The MiDi code is given in squared brackets.

[13] This variable represents the level of current year's earnings after corporate income taxes and any tax-motivated profit shifting activities of MNEs.

+ withdrawal of capital reserves from t to t+1 [p29]

+ withdrawal of revenue reserves from t to t+1 [p30]

– addition to revenue reserves from t to t+1 [p30]

= profit / loss according to the balance sheet

– profits carried forward into t+1 [forward lag of p31]

= dividend payment in t

Due to the approximation of the repatriated dividends, several aspects have to be noted:

i) In the calculation of the dividend variable it is checked whether profits carried forward and profits according to balance sheet are larger than zero in order to avoid adding losses carried forward.

ii) Dividends are set to zero in three cases: (a) if profits according to balance sheet are zero or if balance sheet losses are given; (b) if losses are carried forward and (c) if the derived dividend is negative since the balance sheet profit is smaller than the profits carried forward but both values are positive.

iii) Outliers, defined as dividend payments larger or smaller than three standard deviations from the mean value, are dropped. The same outlier analysis is conducted for variable p32.

iv) The MiDi database provides balance sheet data converted into Euros. As we use data from balance sheets of different years (e.g. t and t+1) the issue of exchange rate stability arises. Balance sheet data in local currencies are not given in the MiDi database. Moreover, the application of the bilateral Euro exchange rate to convert the data into local currencies is complicated for several reasons: (a) different affiliates have different accounting dates so that the Euro exchange rate to be applied varies over affiliates within a particular host country and a given year; (b) as the balance sheet items are expressed in 1,000 Euros, they might be rounded values. Hence, a perfect replication of the balance sheet data in local currency would not be possible even if the "correct" Euro exchange rate were known; (c) a substantial share of affiliates report their balance sheet data to the Deutsche Bundesbank in different currencies in different years.[14] Given these problems, a perfect transformation of the Euro data into local currencies is not

[14]For example, the database contains affiliates which report their balance sheet statement denominated in the local currency of the host country in year t, in Deutschmarks in

possible. To cope with the exchange rate stability problem we calculate an average Euro exchange rate using the exchange rate data provided by the MiDi. The exchange rate used ($Forex_{jt}$) is based on the average over the exchange rates used by all affiliates which have their balance sheet statements denominated in the local currency of the host country in a given year. Thus, affiliates which use other currencies (usually the Deutschmark and the Euro) are not included in this average. We primarily use this variable to construct an additional control variable in the regressions. Yet, as a robustness check we also transform the data using this exchange rate before (to end up with data in local currencies) and after (to end up with data denominated in Euros again) the calculation of the dividend variable and estimate the model with these "converted" data.

v) To check the plausibility of the derived dividend data it is compared with the dividend data provided in the Deutsche Bundesbank's DiKap database. The latter provides effective (positive) dividends received by a German parent aggregated over all its foreign affiliates in a particular host country and a particular year. The figures derived from the MiDi database for 2003, 2004 and 2005 are consistent with those given in the DiKap database. In particular, the reported average (positive) dividend payment the German parent companies included in our sample receive from all of their foreign affiliates according to the DiKap database is (in Euro 1000) 4904.95 (2003), 4934.69 (2004) and 4283.21 (2005). The corresponding values derived from the Midi database are 3879.07 (2003), 3476.69 (2004) and 4399.65 (2005).[15]

We analyze repatriated profits from German affiliates abroad in the manufacturing sector. The reason for the exclusion of service sector industries is that the balance sheet data of these industries (e.g. holding companies, financial intermediaries) would inflate the balance sheet items. Yet, their parent companies may be active in any industry, whether it be manufacturing or services, i.e. they also comprise German holding companies. The host countries of German FDI considered are the EU-15 (without Germany), the new EU member states (NMS-12) and all non-EU OECD-countries excluding Mexico, South Korea and, in the analysis in section 3, due to missing tax data, Iceland and Turkey.

t+1 and in Euros in t+2. Transforming the Euro data using the exchange rate data given by the Midi database would result in using balance sheet items (e.g. p32) denominated in local currency of the host country and in Deutschmarks (e.g. forward lag of p31) in the calculation of the repatriated dividend in year t.

[15]For the "converted" dividend data the DiKap values are (in Euro 1000) 4511.35, 4635.55 and 2923.92. The corresponding Midi values are 4121.09, 3467.66 and 3795.66.

Only those affiliates abroad which are wholly and directly owned by an incorporated German parent company (direct participation[16]) are included in the sample. This is for two reasons: First, to cope with agency problems which might be reduced by using wholly owned affiliates (e.g. Da Silva et al., 2004) and, second, to have to model only one bilateral relationship (Germany and the respective host country of FDI). Thus, we neither model relationships between an affiliate and other affiliates of a common parent, nor between an affiliate and its several parent companies.[17]

The sample spans the time period from 1999 to 2005. These years have been chosen because data on capital reserves contained in the MiDi database are plausibility checked with the beginning of 1999 by the Deutsche Bundesbank. 2005 is the most recent year in the MiDi database when the analysis has been undertaken. In the unbalanced panel, only those firms showing positive or zero dividend payments in at least three consecutive years have been included. This is done to avoid affiliates re-entering the sample after having disappeared from it. The balanced panel covers firms showing positive or zero dividends in the seven consecutive years from 1999 to 2005.[18]

All affiliates included are legal entities. Yet, whether an affiliate is incorporated cannot be ascertained from the MiDi database. It thus cannot be ruled out that the affiliates abroad may also include partnerships and private companies, but according to information provided by the Deutsche Bundesbank these are only exceptional cases. Hence, the vast majority of affiliates is incorporated. Moreover, only affiliates with a balance sheet total of at least 3 mn Euro are included to cope with changes in the balance sheet threshold over time. To sum up, definitions and sources of our variables used in the empirical analysis are given in Table (2) in the appendix.

[16]Lipponer (2008, FN 5 and 6): "In the case of German foreign direct investment, it is the resident investors which are subject to reporting requirements (...). Affiliated investors are those which have come together specifically to establish the investment enterprise, which pursue economic interests jointly by holding participating interests in one or more enterprises or who are closely related to each other (direct related by blood or marriage) or are connected with each other as defined in section 15 of the Companies Act (Aktiengesetz)." A direct investment enterprise is classed as "dependent if the Investor holds more than 50% of the shares or voting rights. If a "dependent" enterprise holds a 100% participating interest in another enterprise than this enterprise and any additional enterprise fulfilling the condition of a 100% participating interest are also regarded as "dependent"."

[17]The effects dividend taxes have on indirect participating interests are analyzed by Weichenrieder and Mintz (2008).

[18]In the sample used in the present study, 85 percent of affiliates have been included in the MiDi database since 1996 and thus the dividend generation process started well before 1999, the first year of observation.

2.3.3 Descriptive evidence on firm-level data

Table (3) in the appendix shows descriptive evidence on the firm-level data taken from the MiDi database. The distinction between dividend payers and non-payers (about 47 percent of our sample) clearly reveals similarities with regard to the size of affiliates and FDI stock, but also marked differences with regard to indebtedness, current earnings and profits according to the balance sheet. In particular, profits according to the balance sheet are negative for non-payers. The mean dividend paid is 1.2 mn (overall) and 2.7 mn (payers) Euro. For the "converted" dividend variable the means are 1.1 mn and 2.3 mn, respectively.

2.3.4 Econometric results for the basic Lintner model

The results for the basic Lintner model are presented in Table (4) of the appendix. These results intend to show whether the Lintner model can be applied to the research problem at hand. Part one of Table (4) shows the results for the pooled Tobit estimator (balanced panel). Short-run Tobit coefficients as well as short-run APEs are given. This estimator does not model the panel structure and thus might lead to an upward bias in the degree of state dependence (dividend smoothing) as outlined in (2.3.1). The statistically highly significant coefficient of the lagged dependent variable, the corresponding speed of adjustment coefficient and the target payout ratio are 0.50 (APE of 0.20), 0.50 (0.80) and 0.52 (0.13), respectively. These results imply that the gap between actual and target payout ratio is reduced by 50 percent after 1 (0.43) year(s).

Part two of Table (4) shows the results derived applying the Wooldridge-estimator (Chamberlain-approach). Modelling unobserved firm heterogeneity in dividend payments indeed leads to a drop in the coefficient on the lagged dependent variable and of the APE to 0.11 and 0.04, respectively. Accordingly, the speed of adjustment coefficient increases to 0.89 (APE of 0.96) and the median lag decreases to 0.31 (0.22) years. The target payout ratio falls and is about 0.31 (0.12).

Part three of the Table shows the results using the Mundlak-approach. Applying this approach does not alter the results. Finally, the impact of using a balanced panel is analyzed in the model shown in the final column, which is based on the pooled Tobit estimator and the unbalanced panel in which affiliates that are in the sample for at least three consecutive years from 1999 to 2005 are included. The coefficients are similar to those shown in part one (balanced panel). This suggests that sample selection problems are of minor importance here.

Hence, these results imply that once we have controlled for unobserved time-invariant firm-specific time invariant effects dividend smoothing is less an issue for German multinational firms' dividend policy. The effects of

disequilibrating shocks are absorbed rather quickly. However, one has to bear in mind that the coefficient on the initial condition (DIV_{it_0}) is positive and highly statistically significant. Thus, firms paying higher dividends at the beginning of the sample period also have higher expected dividend payments. This represents an additional channel of inertia in dividends paid. Most importantly however, the results imply that the Lintner model seems to be valid for analyzing cross-border intra-firm dividend payments. Yet, compared to studies analyzing the public shareholder sphere, the target-payout ratio is lower and the speed of adjustment is higher. From a more substantive perspective these differences are in line with the view that, for the parent-subsidiary sphere, dividend payments are less relevant for signalling and controlling (agency) aims. Other instruments like detailed information on balance sheet positions or internal reporting systems and incentive schemes (e.g. internal job promotion) are available to parent companies to monitor and influence the performance and the behavior of their affiliates' managers. Dividend smoothing and target payout ratios should be lower for cross-border intra-firm dividend decisions.

3 Do taxes have an impact on the amount of dividends repatriated?

After having established that the Lintner model is applicable for the cross-border intra-firm case, the model has to be augmented to capture the effect additional variables exert upon dividend payments. However, before the augmented Lintner model is presented and the various variables used in the estimation are introduced, a brief summary of related literature on the impact dividend taxes exert on dividend payments is given.

3.1 Dividend taxes and intra-firm dividend payments - Survey of the empirical literature

Literature on the impact of dividend taxes on dividend remittances with a focus on German MNEs is scarce. The use of holding companies and ownership chains of German companies' outward FDI, i.e. indirect participating interests (Lipponer, 2008) including partial ownership, has recently been explored by Weichenrieder and Mintz (2008). Ownership chains are *inter alia* used for the "routing" of dividends across third countries in order to lower the tax burden. The findings of Weichenrieder and Mintz (2008) show the importance of withholding taxes as a determinant for the design of ownership chains of German MNEs. Weichenrieder and Mintz (2008) further argue that the gains from using holdings and ownership chains may be expected to be larger for profitable firms that pay large dividends. Thus, one may expect holding companies to be usually used by firms with large profits,

as gains in the form of avoided dividend taxes are high. Thus, establishing a tax effect on dividend payments, even in the case of holding companies excluded from the analysis, as we have done in this study, would emphasize the importance of withholding taxes for repatriation decisions. Hence, this study presents evidence complementary to that given in Weichenrieder and Mintz (2008). Note that Weichenrieder and Mintz also base their analysis on the MiDi database. However, they do not directly model dividends as a function of dividend taxes.

Although not explicitly referring to the Lintner model, some empirical literature which aims to determine the sensitivity of dividend repatriations to tax costs emerged in the US. This literature increasingly focusses on alternatives to dividend repatriations[19], which "is a costly alternative from a tax perspective" (Altshuler and Grubert, 2002, p. 74). The standard model employed by these studies can be summarized as[20]:

$$DIV_i = \gamma_0 + \gamma_1 Tax_i + \gamma_2 Y_i + \gamma_3 Z_i + \gamma_4 X_i + \xi_i \tag{7}$$

with: DIV_i = dividend payment of foreign affiliate i to its US parent, Tax_i = tax on dividend payments, Y_i = affiliate's after tax income; Z_i = vector of other affiliate characteristics, X_i = vector of the characteristics of the US parent, ξ_i = error term.

Hines and Hubbard (1990) use US aggregate time series data on repatriations from 1962 to 1982 as well as micro-data from 1984, the former allowing a differentiation between various repatriation channels (interest paid to the parent to service debt capital contributions and royalty payments). For dividend payers who are in a deficit credit position, the tax on dividends has a negative effect on distribution. The payout ratio increases by 0.16 percentage points upon a one percentage point decrease of the tax variable. Using a Tobit specification, Altshuler and Newlon (1993) again find a negative and significant impact of the dividend tax on affiliates' dividend remittances. Also, higher affiliate net profits increase dividend payments. Evaluated at the mean, the coefficient on the tax variable indicates that an increase in the tax rate by one percentage point decreases the dividend payout ratio by 0.054 percentage points, which translates into approximately a 1.5 percent decrease in dividend payments. (ibidem, p. 108)

From the mid-1990s onwards, a series of closely linked papers emerged. Altshuler et al. (1995a,b) show that the permanent components of tax costs do not affect dividend payments, while transitory components do. This result is in line with the "new view of dividend taxation". They also estimate a Lintner-like model. Based on this model they find that a reduction in the tax rate implies an increase in the overall payout ratio (Altshuler et al.,

[19] E.g., royalties and share repurchases (see Grubert, 1998; Skinner, 2008).

[20] Note, as most of these studies use cross-sectional data we use the subscript i (affiliate i) instead of it.

1995b, p. 265).

Grubert (1998) challenges these findings and argues that the results are due to the omission of alternatives to profit repatriation. Distinguishing various alternatives to dividends, his findings suggest that dividends and other repatriation taxes significantly alter the composition of payments of an affiliate to its US parent. In particular, the "tax price of dividend repatriation discourages dividends, but they do not increase retained earnings." (ibidem, p. 284) Moreover, including all dividend payments by foreign affiliates, i.e. not only those paid to their US parents, suggests that even in countries applying an exemption system (e.g. Germany), the withholding tax rate enters statistically significant in his model.

Altshuler and Grubert (2002) add yet other alternatives to dividend repatriation. Including certain types of triangular relationships, which are important in the US case, they find that "the coefficient for the local withholding tax on dividends is negative, as expected, and highly significant." (p. 103)

Following the large and temporary tax cut on dividend income by the US Jobs and Growth Tax Relief Reconciliation Act of 2003[21], Chetty and Saez (2005) examine the effects of dividend taxation on payout policies. They conclude that the rise in regular dividend payments ... offers perhaps the clearest evidence thus far in the literature that tax policy does matter for dividend payout policies." (p. 828)

In a further study on the effects of the temporary dividend tax cut of the US Jobs Growth Act of 2003, Brown et al. (2007), conclude that firms respond to the tax cut, as the likelihood of a dividend increase following the tax cut is much higher than prior to 2003.[22]

An analysis of the effect of repatriation taxes on dividend payments of US affiliates abroad to their US parents based on the Lintner model is conducted by Desai et al. (2001). They find that a one percent change in the dividend tax rate also changes the volume of dividends repatriated by about one percent. Desai et al. (2001, p. 849) conclude that repatriation taxes "reduce the volume and efficiency of financial flows between affiliates and their American parents." These results are confirmed in Desai et al. (2006).

To summarize, the available empirical evidence implies that dividend taxes do matter for cross-border intra-firm dividend payments. Yet, this result is predominantly established for countries applying the credit system in international taxation.

[21]The US Jobs Growth Act creates a temporary tax holiday that reduces the US tax rate on repatriations from foreign subsidiaries from 35 percent to 5.25 percent (see Blouin and Krull, 2008).

[22]See Blouin and Krull (2008) for details on the characteristics of firms which repatriate under the US Jobs Growth Act.

3.2 An augmented Lintner model

To analyze the impact taxes and other variables exert on dividend payments the Lintner model is augmented as follows (see, e.g. Khan, 2006, for a similar approach):

$$\Delta DIV_{it} = d(DIV_{it}^{*} - DIV_{it-1}) + \epsilon_{it}1 \tag{8}$$

with:

$$DIV_{it}^{*} = rProfit_{it} + zTax_{jt} + wM_{it} + sN_{jt} + hF_{kt} \tag{9}$$

Substituting and rearranging gives

$$DIV_{it} = drProfit_{it} + dzTax_{jt} + d(wM_{it} + sN_{jt} + hF_{kt}) + (1-d)DIV_{it-1} + \epsilon_{it} \tag{10}$$

with: $\epsilon_{it} = c_i + \rho_t + \vartheta_{it}$. Thereby, M_{it}, N_{jt} and F_{kt} are matrices of variables capturing additionally relevant determinants of dividends varying over affiliates (i), host countries (j) or German industries (k). The long- and short-run impacts of taxes on dividends are given in Equation (9) and Equation (10), respectively (z and dz).

3.3 Taxes and additional determinants of dividends

3.3.1 Taxes

In the case of cross-border dividend payments, the relevant dividend tax rate is not only determined by any withholding tax rates levied by host countries of FDI on dividends. In addition, one must consider rules contained in double taxation agreements (DTAs) as well as any unilaterally binding tax laws. Germany has signed DTAs with all host countries included in our analysis. Thus, the withholding tax rates on dividends as given in the DTAs are relevant. Germany applies the exemption method in international taxation, implying that dividends repatriated are not further taxed in Germany. Yet, due to stipulations concerning the deductibility of operating costs this exemption is provided only for 95 percent of the dividends repatriated since 1999.[23] Five percent of repatriated dividends are taxed by the German corporate income tax rate (including local business tax rates and the solidarity

[23] Art. 8b/7 of the German Koerperschaftssteuergesetz (German corporate income tax law) is introduced via the "Steuerentlastungsgesetz 1999/2000/2002" (March 1999). Originally Art. 8b/7 stipulates that 15 percent of a foreign dividend are effectively taxed due to stipulations concerning deductibility of operating costs. As these 15 percent were against the EU Parent Subsidiary Directive this rate was reduced later in 1999 via the "Steuerbereinigungsgesetz" (Dezember 1999) to 5 percent. In the current German Koerperschaftssteuergesetz the stipulations contained in Art. 8b/7 reappeared in Art. 8/5 and also had a broader focus (from 2002 onwards). Thus, the 95 percent exemption has been applied in Germany since 1999 (see e.g. German Ministry of Finance, 2008; Leis, 2004; KPMG, 2007).

surcharge). Moreover, for EU host countries of German FDI, the Parent-Subsidiary-Directive (PSD) applies. The latter *inter alia* stipulates that the withholding tax rates on dividends be set to zero. Yet, only 14 countries applied the PSD throughout the whole sample period (the old EU-member countries), ten countries have applied it from 2004 onwards (the NMS which joined the EU in 2004) and two EU-member states (Bulgaria and Romania) have applied the PSD from 2007 onwards. Thus, the applied dividend tax rate and its variability over time and host countries, respectively, depend on (i) the host country (EU member country or third country), (ii) the withholding tax rate according to the DTA and (iii) the German overall tax rate on corporate income. The dividend tax rate (Tax_{jt}, in percent) which is used in the empirical analysis is calculated as:

$$Tax_{jt} = \tau_{jt} * 100 + (100 - \tau_{jt} * 100) * 0.05 * \tau_{DE,t} \tag{11}$$

with: τ_j = withholding tax rate on dividends of host country j according to DTA (proportion); τ_j is zero if PSD applies; τ_{DE} = overall corporate income tax rate of Germany (proportion); 0.05 is due to 95 percent exemption, 100 = assumed gross return of Euro 100 distributed as dividend.[24]

Dividends are only one means of transferring funds from the subsidiary to the parent. Another means is share repurchases by the affiliate which are subject to capital gains taxes. Thus, dividend repatriation policy might also depend on the taxation of share repurchases made by the affiliate. It is likely that dividend payments decrease if the taxation of capital gains is reduced. To capture the influence of share repurchases on dividend policy, we follow Poterba (2004) and apply a "tax discrimination factor" (TD_{jt}) in our analysis. TD_{jt} measures the net or post-capital gains tax return from share repurchases in percent of the net or after dividend tax rate dividend payment (having an equal gross return of Euro 100). With respect to capital gains taxes, one has to bear in mind that most of the DTAs signed by Germany preclude a withholding tax on capital gains at source (according to the Art 13/5 of the OECD-DTA convention; Vogel and Lehner, 1996, 2003, 2008). Moreover, those host countries which have not included Art. 13/5 in their DTA with Germany (i.e. Australia, Czech Republic, Bulgaria, Cyprus, Slovak Republic, New Zealand and Norway) also do not levy capital gains taxes on shares repurchased. Thus, capital gains realized through share repurchases are not taxed at source. Furthermore, Germany applies the exemption method in case of capital gains. Yet, as in the case for dividends, only 95 percent of capital gains received have effectively been exempted since 2004 due to stipulations concerning the deductibility of operating costs (see German Ministry of Finance, 2008). Thus, for the period until 2004 TD_{jt} is calculated as:

[24] For example, Tax_{jt} for j being an old EU member country and t being 2005 is 0 + (100 - 0)*0.05*0.386 = 1.93 percent.

$$TD_{jt} = (\frac{1}{(1-\tau_{jt}) * (1-0.05 * \tau_{DE,t})}) * 100 \quad (12)$$

For the years 2004 and 2005 TD_{jt} is calculated as:

$$TD_{jt} = (\frac{(1-0.05 * \tau_{DE,t})}{((1-\tau_{jt}) * (1-0.05 * \tau_{DE,t}))}) * 100 \quad (13)$$

with: τ_j = withholding tax rate on dividends of host country j according to DTA (proportion); τ_j is zero if PSD applies; τ_{DE} = overall corporate income tax rate of Germany (proportion); 0.05 is due to 95 percent exemption[25].

We expect that a higher Tax_{jt} reduces the expected value of dividends repatriated, as the Euro value of one unit dividend repatriated is reduced. Thus, a negative sign of the short- and long-run tax coefficient is expected. Furthermore, as an increase in TD_{jt} implies that transferring funds by share repurchases is relatively cheaper (in terms of tax burden borne), a negatively signed coefficient of TD_{jt} is expected, too.

3.3.2 Other determinants of dividends

Besides the Lintner-type variables, ($DIV_{i,t-1}$, $Profit_{it}$) and the initial dividend payment (DIV_{it_0}) we include several variables that have been shown as important determinants of repatriation policies in theoretical and empirical papers.

A first group of determinants of dividends contained in the M_{it}, N_{jt} and F_{kt} matrices in Equation (10) relates to liquidity of the affiliate. Internal and external debt plays a role here: Firms with greater debt ratios and likely higher claims from interest expense on their earnings are less likely to pay dividends (Brown et al., 2007, p. 19). Higher debt constrains liquidity and the tight liquidity position of affiliates should then have a negative impact on the ability and willingness to pay out dividends. Therefore, we use a firm-specific debt indicator ($debt_{it}$) of long- and short-run company debt in the empirical analysis. Note, as an affiliate's debt might be simultaneously determined with dividends paid, the one-year lagged debt variable is used. A negatively signed coefficient is expected.

Note, that debt financing of affiliates might also be used as a device to control the affiliates. Higher debt may reduce agency problems between the parent company and the affiliate in a similar way to dividend payouts (e.g. Brown et al., 2007, footnote 14). This agency argument is also related to a country's risk level, as it is usually maintained that an affiliate in a culturally or institutionally distant and/or politically risky country would present a

[25]For example, Tax_{jt} for j being an old EU member country and t being 2005 is $100 * (1 - 0.05 * 0.386)/(100 * (1 - 0) * (1 - 0.05 * 0.386)) * 100 = 100$ as τ_j is zero due to the PSD and the 95 percent exemption applies to foreign dividends and foreign capital gains in 2005.

greater agency risk to the parent. Therefore the parent would desire a higher degree of control of the affiliate's investment behavior. "Under such conditions, the parent might require higher intra-firm dividend payments [...] than it requires from its other affiliates in less risky or more familiar markets." (Lundan, 2006, p. 57) This argument is confirmed, for example, by evidence presented in Lehmann and Mody (2004), who find on the basis of aggregate data that the payout ratio appears to be *lower* for less risky countries. Moreover, Altshuler and Newlon (1993, p. 107) mention that country risk factors may explain the positive country effects on dividend remittances for certain countries. Thus, we include a proxy for the level of a host country's political risk ($Risk_{jt}$) in the augmented Lintner model. As the level of risk decreases with an increase in the value of $Risk_{jt}$, a negatively signed coefficient is expected.[26] Note that it is conceivable that affiliates which are partially owned pay higher dividends than wholly-owned firms, as local influence is possibly higher in the former (e.g. Desai et al., 2006). To cope with this channel of agency problems, only wholly-owned affiliates are used in the empirical analysis.

Another group of determinants focusses on investment and growth opportunities either in the host or the home country, and is also related to the liquidity issues discussed above. On the one hand foreign affiliates with attractive investment opportunities may finance their new capital expenditures *inter alia* by reducing or omitting dividends to their parent companies. The host country real growth rate ($Growth_{jt}$) is used to proxy for growth opportunities of the affiliate. Since we include only manufacturing affiliates in our analysis, we use the aggregate growth rate of the manufacturing sector of each host country of German affiliates. We expect a negative relationship with dividends. On the other hand repatriated dividends may increase if growth opportunities in the home country (Germany) are soaring. Industry-level real growth rates ($Growth_{kt}$) are used to capture investment opportunities in Germany.

The size of the affiliate ($Size_{it}$) is considered as another firm-specific factor determining the expected dividend repatriated. In their empirical study on UK repatriation, Bond et al. (2005) find that "larger firms tend to have higher dividend payout ratios" (p. 60; also see Benito and Young, 2003). This might be due to the higher market power of larger firms which could *ceteris paribus* translate into higher dividend payouts. Furthermore, the size variable may capture the age of the firm, as older firms are larger and are expected to pay higher dividends due to lower growth opportunities and larger retained earnings. In a similar vein, Brown et al. (2007) include firm size among the set of covariates in their study of the effect of executive

[26]Desai et al. (2004, p. 2467) maintain that affiliates located in a high risk country should be financed more by local indebtedness and thus lower dividends should follow. Yet, given the level of debt - as implied by the *ceteris paribus* condition in an econometric analysis - a higher country risk should lead to higher dividends.

stock ownership on dividend payouts, yet no results are displayed on this variable.[27]

Table (2) in the appendix also includes the details of the variables used in the subsequent empirical estimation and Table (5) also displayed in the appendix shows the descriptive evidence for the additional control variables used.

3.4 Econometric results for the augmented Lintner model

Applying the Tobit estimator proposed by Wooldridge (2005) leads to the results displayed in Table (6) given in the appendix to the paper. In the second (based on the Chamberlain-approach; model 1) and the third (based on the Mundlak-approach; model 2) column results for the full model, including all variables discussed above, are given. As the results are robust with respect to the approach used to model affiliate-specific effects, the remaining models contained in Table (6) are based on the computationally simpler Mundlak-approach. Models 3 to 5 differ from model 2 by excluding insignificant control variables one at a time. Model 6 is our "preferred" model in the sense that it contains only statistically significant variables. Finally, in model 7 the dividend tax rate (Tax_{jt}) is substituted by the tax discrimination factor, TD_{jt}, which incorporates the taxation of capital gains.

Models 2 to 6 of Table (6) reveal that dividend taxes indeed impact negatively on the expected value of the repatriated dividends from wholly and directly owned foreign affiliates. This is also the case if Tax_{jt} is substituted by the tax discrimination factor (model 7). An increase in TD_{jt}, which might arise either if the capital gains tax rate decreases or the dividend tax rate increases (*ceteris paribus*), leads to a fall in expected dividends repatriated. Thus, using TD_{jt} reinforces the results derived by applying the dividend tax rate.

Concerning the control variables included, the Lintner-type variables (lagged dividend and current year's earnings) and the initial dividend payment as well as an affiliate's size and indebtedness enter statistically significant. The proxies capturing the growth opportunities as well as a host country's political risk level fall short of statistical significance. Due to the relatively high level of political stability in the host countries included, the insignificance of $Risk_{jt}$ is not unexpected. Moreover, the insignificance of $Growth_{kt}$ might be an indication for the rather poor growth performance of Germany over the majority of years considered in the analysis. The insignificance of $Growth_{jt}$ is somewhat unexpected. It might be an indication of the location of many German affiliates in countries where growth is rather sluggish during the sample period. Moreover, the inclusion of a full set of

[27] Note that most of the models estimated also include $Forex_{jt}$ as defined above as an additional variable in the N_{jt} matrix.

time dummies might partly capture the effect of both variables, $Growth_{jt}$ and $Growth_{kt}$.

Table (6) gives an impression which variables impact significantly (positively or negatively) on repatriated dividends. Yet, in order to derive the economic effects of these variables, APEs are more useful than Tobit coefficients. The second and third column of Table (7) show the short- und long-run APEs derived based on model 6 of Table (6).

Using the short-run APEs shown in column two of Table 7 implies that a one percentage point decrease in the dividend tax rate increases the conditional expectation of dividend payments by about 43 thsd. Euro. This result implies that, if Germany would abandon the taxation of 5 percent of dividends repatriated which leads to a decrease of the dividend tax rate from about 2 percent to zero for EU member host countries, dividends repatriated by foreign affiliates in these countries would increase by about 86 thsd. Euro.

Evaluating the effect of a one percentage point decrease in the dividend tax rate at the overall mean value of dividends repatriated by affiliates (1.2 mn Euro) implies a semi-elasticity of dividends with respect to the dividend tax rate of about -3.5 (calculated as -43/1215*100). In the long-run the effect increases slightly to about 45 thsd. Euro (cf. column three of Table 7) or a semi-elasticity of about -3.7. If the mean of positive dividend payments (2.7 mn Euro) is used the semi-elasticities derived are -1.6 and -1.7, respectively.

3.5 Robustness checks

The remaining columns of Table (7) (models 8 and 9) include further robustness checks. Model 8 gives estimates for the preferred model 6 being estimated using the Chamberlain-approach rather than the Mundlak-approach. Again, the results are robust with respect to the way affiliate-specific effects are modelled. Model 9 shows that the substantive results already contained in model 6 of Table (6) do not change if we use "converted" balance sheet data to derive the dividend variable instead of using $Forex_{jt}$ as an additional control variable. The estimated tax effect remains statistically significant and it increases (in absolute value) from -117 (model 6) to -155 (model 9). Finally, note that the coefficients of the Lintner-type variables as well as the coefficient of the initial dividend payment are also in this case in line with the results displayed in Table (4).

4 Summary

The aim of this study is to explore whether dividend tax rates have a statistically and economically relevant impact on the expected value of dividend repatriated from foreign wholly-owned manufacturing affiliates to their German parent company over the 1999-2005 period. The study is based on

the Lintner model. As this model does not directly model cross-border intra-firm dividend payments, in a first step the empirical relevance of the Lintner model for such cases is analyzed. Then the basic Lintner model is augmented to capture the effects of additional variables on the expected dividend payment. Our results imply that dividend taxation has an impact on firms' payout policies. Specifically, we derive a semi-elasticities of about -3.5 (evaluated at the overall mean) and -1.6 (evaluated at the mean of positive dividends), respectively, implying that a one percentage point change in the dividend tax rate will change dividends repatriated by 3.5 (1.6) percent. It has to be stressed, that our analysis is based on direct participations in the manufacturing sector only. Thus, the analysis complements the results derived by Weichenrieder and Mintz (2008), which show that dividend taxes impact on the location of holding companies and the structure of international ownership chains by German MNEs in general. Holding companies are predominantly used to channel profits of highly profitable affiliates. Thus, establishing a tax effect even in case of direct participations underlines the role of dividend taxes for repatriation decisions of firms.

References

Adaoglu, C., 2000. Instability in the dividend policy of the Istanbul Stock Exchange (ise) corporations: Evidence from an emerging market. Emerging Markets Review 1, 252–270.

Altshuler, R., Grubert, H., 2002. Repatriation taxes, repatriation strategies and multinational financial policy. Journal of Public Economics 87 (1), 73–107.

Altshuler, R., Newlon, T. S., 1993. The effects of U.S. tax policy on the income repatriation patterns of U.S. multinational corporations. In: Giovannini, A., Hubbard, G., Slemrod, J. (Eds.), Studies in International Taxation. University of Chicago Press, pp. 77–115.

Altshuler, R., Newlon, T. S., Randolph, W., 1995a. Tax planning, timing effects and the impact of repatriation taxes on dividend remittances. In: Feldstein, M., Hines, J. R. J., Hubbard, G. (Eds.), Taxing Multinational Corporations. University of Chicago Press, pp. 63–72.

Altshuler, R., Newlon, T. S., Randolph, W., 1995b. Do repatriation taxes matter? Evidence from the tax returns of U.S. multinationals. In: Feldstein, M., Hines, J. R. J., Hubbard, G. (Eds.), The Effects of Taxation on Multinational Corporations. University of Chicago Press, pp. 253–272.

Andres, C., Betzer, A., Goergen, M., Renneboog, L., 2009. Dividend policy of German firms: A panel data analysis of partial adjustment models. Journal of Empirical Finance 16, 175–187.

Baltagi, B., 2008. Econometric Analysis of Panel Data,, 4th Edition. John Wiley and Sons.

Behm, U., Zimmermann, H., 1993. The empirical relationship between dividends and earnings in German. Zeitschrift fuer Wirtschaft- und Sozialwissenschaften 113, 225–254.

Benartzi, S., Michaely, R., Thaler, R. H., 1997. Do changes in dividends signal the future or the past? Journal of Finance 52 (3), 1007–1033.

Benito, A., Young, G., 2003. Hard times or great expectations? Dividend omissions and dividend cuts by UK firms. Oxford Bulletin of Economics and Statistics 65 (5), 531–555.

Bessler, W., Ellermann, H. H., 2004. Theoretische Ansaetze zur Dividendenpolitik. In: Achleitner, A.-K., Thoma, G. F. (Eds.), Handbuch Corporate Finance. Verlagsgruppe Deutscher Wirtschaftsdienst, pp. 1–26.

Blouin, J., Krull, L., 2008. Brining it home: A study of the incentives surrounding the repatriation of foreign earnings under the American jobs creation act of 2004.
URL `http://ssrn.com/abstract=925348`

Bond, S. R., Devereux, M. P., Klemm, A., 2005. Dissecting dividend decisions: Some clues about the effects of dividend taxation from recent UK reforms. Working Paper WP05/17, IFS.

Brittain, J. A., 1964. The tax structure and corporate dividend. American Economic Review, 272–287.

Brown, J. R., Liang, N., Weisbenner, S., 2007. Executive financial incentives and payout policy: Firm responses to the 2003 dividend tax cut. Journal of Finance 62 (4), 1935 – 1965.

Chauvin, N. D., Kraay, A., 2007. Who gets debt relief? Journal of the European Economic Association 5 (2-3), 333–342.

Chetty, R., Saez, E., 2005. Dividend taxes and corporate behaviour: Evidence from the 2003 dividend tax cut. The Quarterly Journal of Economics CXX (3), 791–833.

Da Silva, C., Goergen, M., Renneboog, L., 2004. Dividend Policy and Corporate Governance. Oxford University Press, Oxford.

Desai, M. A., Foley, C. F., Hines, J. R., 2001. Repatriation taxes and dividend distortions. National Tax Journal LIV (4), 829–851.

Desai, M. A., Foley, C. F., Hines, J. R., 2004. A multinational perspective on capital structure choice and internal capital markets. Journal of Finance 59 (6), 2451–2488.

Desai, M. A., Foley, C. F., Hines, J. R., 2006. Dividend policy inside the multinational firm. Financial Management 36 (1), 5–26.

Fama, E. F., Babiak, H., 1968. Dividend policy: An empirical analysis. Journal of the American Statistical Association 63 (3), 1132–1161.

German Ministry of Finance, 2008. Behandlung von Betriebsausgaben im Zusammenhang mit Auslandsdividenden in den Veranlagungszeitraeumen (vz) 1993 und 2003. Communication via electronic mail, German Ministry of Finance.

Glen, J. D., Karmokolias, Y., Miller, R. R., Shah, S., 1995. Dividend policy and behaviour in emerging markets. Discussion Paper 26, IFC.

Gordon, R., Dietz, M., 2006. Dividends and taxes. Working Paper 12292, NBER, Cambridge (Mass.).

Grubert, H., 1998. Taxes, and the division of foreign operating income among royalties, interest, dividends and retained earnings. Journal of Public Economics 68, 269–290.

Grubert, H., 2001. Enacting dividend exemption and tax revenue. National Tax Journal LIV (3), 811–827.

Heckman, J. J., 1981a. Heterogeneity and state dependence. In: Rosen, S. (Ed.), Studies in Labor Markets. University of Chicago Press, Chicago, pp. 91–139.

Heckman, J. J., 1981b. The incidental parameters problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process. In: Manski, C., McFadden, D. (Eds.), Structural Analysis of Discrete Data with Econometric Applications. MA: MIT Press, Cambridge, pp. 179–195.

Hines, J. R. J., Hubbard, G. R., 1990. Coming home to America: Dividend repatriations by U.S. multinationals. In: Razin, A., Slemrod, J. (Eds.), Taxation in the global economy. University of Chicago Press, Chicago, pp. 161–207.

Hsiao, C., 2003. Analysis of Panel Data, 2nd Edition. No. 34 in Econometric Society monograph. Cambridge University Press, Cambridge.

Khan, T., March 2006. Company dividends and ownership structure: Evidence from UK panel data. The Economic Journal 116, C172–C189.

KPMG, March 2007. Federal tax court: Non-deductibility of deemed shareholding expenses. German Tax Monthly, March.

Lehmann, A., Mody, A., January 2004. International dividend repatriations. Working Paper Series WP04/05, International Monetary Fund.
URL http://www.imf.org/external/pubs/ft/wp/2004/wp0405.pdf

Leis, G., 23. January 2004. Steueraenderungen zum 1.1.2004 im Ueberblick. Finanzrundschau 86 (2), 53–71.

Lintner, J., 1956. Distribution of incomes of corporations among dividends, retained earnings and taxes. The American Economic Review 46 (2), 97–113.

Lipponer, A., April 2008. Microdatabase Direct Investment-MiDi: A brief guide. Tech. rep., German Bundesbank, Frankfurt.

Loudermilk, M., 2007. Estimation of fractional dependent variables in dynamic panel data models with an application to firm dividend policy. American Statistical Association 25 (4), 462–472.

Lundan, S., 2006. Reinvested earnings as a component of FDI: An analytical review of the determinants of reinvestment. Transnational Corporations 15 (3), 33–64.

Marsh, T., Merton, R. C., 1987. Dividend behaviour of the aggregate stock market. Journal of Business 60, 1–40.

Pindyck, R., Rubinfeld, D., 1998. Econometric Models and Economic Forecasts, 4th Edition. McGraw Hill, Sussex.

Poggi, A., 2007. Does persistence of social exclusion exist in Spain? Journal of Economic Inequality 5 (1), 53–72.

Poterba, J., 2004. Taxation and corporate payout policy. American Economic Review 94 (2), 171–175.

Scaperlanda, A., Mauer, L. J., 1972. Remittances from United States direct foreign investment in the european economic community: An exploratory estimate of their determinants. Economia Internazionale XXV (1), 33–43.

Skinner, D. J., 2008. The evolving relation between earnings, dividends, and stock repurchases. Journal of Financial Economics 87 (3), 582–609.

Van Eije, H., Megginson, W., 2008. Dividends and share repurchases in the European Union. Journal of Financial Economics 89 (2), 583–589.

Verbeek, M., 2008. A guide to modern econometrics, 3rd Edition. John Wiley and Sons, Sussex.

Vogel, K., Lehner, M., 1996. Doppelbesteuerungsabkommen der Bundesrepublik Deutschland auf dem Gebiet der Steuern vom Einkommen und Vermoegen. Verlag C.H. Beck, Munich.

Vogel, K., Lehner, M., 2003. Doppelbesteuerungsabkommen der Bundesrepublik Deutschland auf dem Gebiet der Steuern vom Einkommen und Vermoegen. Verlag C.H. Beck, Munich.

Vogel, K., Lehner, M., 2008. Doppelbesteuerungsabkommen der Bundesrepublik Deutschland auf dem Gebiet der Steuern vom Einkommen und Vermoegen. Verlag C.H. Beck, Munich.

Weichenrieder, A. J., Mintz, J. M., 2008. What determines the use of holding companies and ownership chains? Working Paper WP08/03, Oxford University Center for Business Taxation, Oxford.

Wooldridge, J. M., 2002. Econometric Analysis of Cross-Section and Panel Data. MIT Press, Cambridge, M.A.

Wooldridge, J. M., 2005. Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. Journal of Applied Econometrics 20, 39–54.

Appendix: Tables

Table 1: : Overview of main studies using the Lintner model

Personal shareholder sphere (selected studies)	Speed of adjustment	Averaged long-run payout ratio	Median adjustment lag
OLS			
Lintner 1956 (AER)*)	0.30	0.50	1.94
Fama and Babiak 1968 (JASA)	0.40	0.38	1.36
Van Eije and Megginson 2008 (JFE)	0.57	0.44	0.82
Skinner 2008 (JCF)	0.18	0.61	3.49
Behm and Zimmermann 1993 (ZWS; for DE)	0.16	0.52	4.12
Da Silva et al. 2004 (OUP, for DE)	0.22	0.40	2.73
Andres et al. 2009 (JEF, for DE)	0.21	0.27	2.96
Average across 32 studies	0.44	0.40	1.89

Intra-firm dividends	Speed of adjustment	Averaged long-run payout ratio	Median adjustment lag
OLS			
Lehmann and Mody 2004 (IMF, for DE)	0.65	0.23	0.66
Desai et al. 2001 (NTJ)	0.73	0.56	0.53
Desai et al. 2006 (FM)	0.77	0.48	0.47
Desai et al. 2006 (FM)	0.53	0.61	0.91
Average across 4 studies	0.70	0.38	0.60
Tobit			
Desai et al. 2001 (NTJ)	0.67	0.88	0.62
Desai et al. 2006 (FM)	0.77	0.37	0.47
DE = Germany			

*) see list of references for full name of Journals.

Table 2: Definition and sources of variables

Abbreviation	Data Source	Variable	Expected Sign
DIV_{it}	Dependent variable; calculated on the basis of the MiDi database of the Deutsche Bundesbank	Derived dividend payments of German wholly-owned affiliates abroad to their German parent companies in Euro 1.000	
Explanatory variables: Firm level			
DIV_{it_0}	Initial value of the dependent variable; calculated on the basis of the MiDi database of the Deutsche Bundesbank	Derived dividend payments of German wholly-owned affiliates abroad to their German parent companies in Euro 1.000 in 1999	+
DIV_{it-1}	Lagged dependent variable		+
$Profit_{it}$	Calculated on the basis of the MiDi database of the Deutsche Bundesbank	Variable p32, Profit and loss for the financial year (after taxes, prior to profit distribution, and offsetting of losses carried forward) of affiliate I, in Euro 1000	+
$Debt_{it}$	MiDi database of the Deutsche Bundesbank	Liabilities (p33) and other liabilities (p39) of affiliate i as percent of balance sheet total (p40)	-
$Debt_{it-1}$	MiDi database of the Deutsche Bundesbank	Liabilities (p33) and other liabilities (p39) of affiliate i as percent of balance sheet total (p40)	-
$Size_{it}$	MiDi database of the Deutsche Bundesbank	Number of employees (pk05) of affiliate i	+
Explanatory variables: Industry and country level			
$Growth_{kt}$	EUKLEMS database	Real annual industry growth rate of value added in German industry k; EUKLEMS variable GO_QI	+
$Growth_{jt}$	OECD, supplemented by WIIW database	Real annual growth rate of value added in manufacturing sector of host country j; EUKLEMS variable GO_QI	-
TAX_{jt}	Double Taxation Agreements (European Tax Handbook), EU-Parent Subsidiary Directive; German Ministry of Finance (2008)	Dividend tax on repatriation of income from host country j to Germany	-
TD_{jt}	Double Taxation Agreements (European Tax Handbook), EU-Parent Subsidiary Directive, Vogel and Lehner (2008), German Ministry of Finance(2008)	Ratio of net capital gains and net dividends received upon repatriation of 100 Euro of funds from host country j to Germany	-
$Risk_{jt}$	Euromoney	Political risk index of host country j ranging from zero (highest risk level) to 25 (lowest possible risk level)	-
$Forex_{jt}$	MiDi database of the Deutsche Bundesbank	Forward lag of change in bilateral Euro exchange rate	n.i.

Note: n.i. = not interpreted as this variable is included to cope with the exchange rate stability problem as outlined in the main text.

Table 3: Descriptive statistics

			Whole sample			Dividend payers			Non-payers		
Variable	Unit	Names	Firms	Mean	Std. Dev.	Firms	Mean	Std. Dev.	Firms	Mean	Std. Dev.
Derived dividends	1000	DIV_{it}	587	1215.72	3343.11	267	2669.9	4546.15	320	0	0
Derived dividends converted	1000	$CDIV_{it}$	523	1053.71	3044.31	243	2265.38	4145.27	320	0	0
Current Earnings	1000	$Profit_{it}$	587	1556.69	5872.99	267	2560.42	4381.06	320	717.56	6763.79
Profit/loss according to balance sheet	1000	PBS_{it}	587	2976.63	15823.48	267	6832.16	10731.21	320	-246.65	18458.23
Debt	1000	$Debt_{it}$	587	48.23	27.87	267	39.38	20.8	320	55.63	30.74
Size	Number of employees	$Size_{it}$	587	249.37	334.98	267	245.45	344.27	320	252.65	327.06
FDI stock	1000	FDI_{it}	587	18826.75	27125.46	267	19102.55	23751.37	320	18596.19	29656.4

Table 4: Regression Results for the basic Lintner model

	Pooled Tobit balanced sample		*Chamberlain*		*Mundlak*		*Pooled Tobit unbalanced sample*	
Variable	Coefficient	APE	Coefficient	APE	Coefficient	APE	Coefficient	APE
DIV_{it-1}	0.504***	0.201	0.108***	0.043	0.124***	0.047	0.507***	0.188
	(0.027)	(0.008)	(0.031)		(0.032)		(0.021)	(0.008)
DIV_{it_0}			0.280***	0.111	0.353***	0.134		
			(0.051)		(0.053)			
$Profit_{it}$	0.256***	0.102	0.332***	0.132	0.316***	0.12	0.257***	0.096
	(0.016)	(0.007)	(0.026)		(0.026)		(0.012)	(0.005)
$Forex_{jt}$	95.882***	n.i.	145.845***	n.i.	137.4***	n.i.	73.493***	n.i.
	(13.578)		(15.398)		(14.806)		(9.523)	
Obs	3534		3534		3534		6318	
Firms	589		589		589		1306	

Notes: Time dummies included; *** / ** / * = 1% / 5% / 10% significance level; APE = Average Partial Effect; Obs = observations; DIV = Dividend paid; Forex = forward lag of the change in the average bilateral Euro exchange rate; Standard errors in parentheses; j = host country j; k = German industry k; i = affiliate i; t = year; n.i = not interpreted as this variable is included to cope with the exchange rate stability problem as outlined in the main text.

Table 5: Descriptive evidence on additional variables used in the augmented Lintner model

	Whole sample				Dividend payers				Non-payers			
Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
$Growth_{kt}$	1.17	1.09	-0.21	3.21	1.17	1.09	-0.21	3.21	1.17	1.09	-0.21	3.21
Tax_{jt}	4.17	3.55	1.93	17.07	4.03	3.56	1.93	17.07	4.29	3.54	1.93	17.07
TD_{jt}	103.95	4.45	100.00	120.93	103.90	4.47	100.00	120.93	104.06	4.42	100.00	120.93
$Growth_{jt}$	2.74	4.17	-19.95	25.07	2.39	3.91	-19.95	25.07	3.04	4.35	-19.95	25.07
$Risk_{jt}$	22.50	2.94	7.84	25.00	22.71	2.76	8.11	25.00	22.32	3.07	8.11	25.00
$Forex_{jt}$	0.47	6.32	-21.45	80.43	1.70	6.40	-21.45	80.43	-0.55	6.07	-21.45	80.43

Table 6: Regression results for the augmented Lintner model

Approach/	*Chamberlain*			*Mundlak*			
Variable	*(model 1)*	*(model 2)*	*(model 3)*	*(model 4)*	*(model 5)*	*(model 6)*	*(model 7)*
DIV_{it-1}	0.082***	0.091***	0.092***	0.092***	0.093***	0.094***	0.094***
	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
DIV_{it_0}	0.268***	0.314***	0.313***	0.315***	0.324***	0.339***	0.339***
	(0.050)	(0.050)	(0.050)	(0.050)	(0.05)	(0.051)	(0.051)
$Profit_{it}$	0.323***	0.305***	0.305***	0.305***	0.305***	0.306***	0.306***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
$Size_{it}$	3.046***	3.132***	3.138***	3.138***	3.080***	3.035***	3.075***
	(1.022)	(0.974)	(0.974)	(0.973)	(0.974)	(0.973)	(0.972)
Tax_{jt}	**-127.146****	**-140.069****	**-140.530****	**-136.792****	**-119.478***	**-117.254***	
	(65.462)	**(65.581)**	**(65.589)**	**(65.426)**	**(62.675)**	**(62.578)**	
TD_{jt}							**-91.370***
							(53.680)
$Debt_{it-1}$	-48.399***	-46.795***	-46.625***	-46.988***	-46.553***	-46.424***	-46.600***
	(8.565)	(8.515)	(8.502)	(8.513)	(8.521)	(8.498)	(8.497)
$Growth_{jt}$	20.971	24.454	24.073		15.093		
	(34.948)	(34.82)	(34.824)		(34.359)		
$Growth_{kt}$	-18.069	-9.879		-9.599	-9.515		
	(29.418)	(29.257)		(29.256)	(29.284)		
$Risk_{jt}$	-226.722	-227.356	-227.461	-208.086			
	(204.438)	(203.126)	(203.181)	(200.6925)			
$Forex_{jt}$	156.583***	158.749***	158.89***	155.323***	160.158***	157.071***	157.396***
	(17.243)	(17.225)	(17.229)	(16.538)	(17.018)	(16.160)	(16.147)
Obs.	3522	3522	3522	3522	3522	3522	3522
Firms	587	587	587	587	587	587	587

Notes: Time dummies included; *** / ** / * = significant at 1% / 5%; / 10%; Standard errors in parentheses; j = host country j; k = German industry k; i = affiliate i; t = year; Forex = forward lag of the change in the average bilateral Euro exchange rate.

Table 7: APEs and regression results for additional versions of the augmented Lintner model

Approach/ Variable	*SR-APE*	*LR-APE*	*Chamberlain (model 8)*	*Mundlak (model 9)*
DIV_{it-1}	0.035*		0.081**	0.053*
	(0.019)		(0.032)	(0.032)
DIV_{it_0}	0.126***	0.130	0.271***	0.245***
	(0.017)		(0.050)	(0.044)
$Profit_{it}$	0.113***	0.117	0.322***	0.265***
	(0.020)		(0.026)	(0.026)
$Size_{it}$	1.123*	1.164	3.007***	3.620***
	(0.589)		(1.024)	(1.015)
Tax_{jt}	**-43.393****	**-44.949**	**-105.157***	**-155.173****
	(19.210)		**(62.590)**	**(73.004)**
$Debt_{it-1}$	-17.180***	-17.797	-47.516***	-34.784***
	(3.604)		(8.528)	(8.183)
$Forex_{jt}$	n.i.	n.i.	157.029***	
			(16.231)	
Obs.	3522	3522	Yes	3138
Firms	587	587	3522	523

Notes: *** / ** / * = significant at 1% / 5% / 10%; Time dummies are included; Standard errors in parentheses; j = host country j; i = affiliate i; t = year; APE = Average Partial Effect; Standard errors derived using a non-parametric bootstrap-approach with 50 replications; SR / LR = short / long-run coefficients; $Forex_{jt}$ = forward lag of the change in the average bilateral Euro exchange rate; n.i = not interpreted as this variable is included to cope with the exchange rate stability problem as outlined in the main text.

The following Discussion Papers have been published since 2008:

Series 1: Economic Studies

01	2008	Can capacity constraints explain asymmetries of the business cycle?	Malte Knüppel
02	2008	Communication, decision-making and the optimal degree of transparency of monetary policy committees	Anke Weber
03	2008	The impact of thin-capitalization rules on multinationals' financing and investment decisions	Buettner, Overesch Schreiber, Wamser
04	2008	Comparing the DSGE model with the factor model: an out-of-sample forecasting experiment	Mu-Chun Wang
05	2008	Financial markets and the current account – emerging Europe versus emerging Asia	Sabine Herrmann Adalbert Winkler
06	2008	The German sub-national government bond market: evolution, yields and liquidity	Alexander Schulz Guntram B. Wolff
07	2008	Integration of financial markets and national price levels: the role of exchange rate volatility	Mathias Hoffmann Peter Tillmann
08	2008	Business cycle evidence on firm entry	Vivien Lewis
09	2008	Panel estimation of state dependent adjustment when the target is unobserved	Ulf von Kalckreuth
10	2008	Nonlinear oil price dynamics – a tale of heterogeneous speculators?	Stefan Reitz Ulf Slopek
11	2008	Financing constraints, firm level adjustment of capital and aggregate implications	Ulf von Kalckreuth

12	2008	Sovereign bond market integration: the euro, trading platforms and globalization	Alexander Schulz Guntram B. Wolff
13	2008	Great moderation at the firm level? Unconditional versus conditional output volatility	Claudia M. Buch Jörg Döpke Kerstin Stahn
14	2008	How informative are macroeconomic risk forecasts? An examination of the Bank of England's inflation forecasts	Malte Knüppel Guido Schultefrankenfeld
15	2008	Foreign (in)direct investment and corporate taxation	Georg Wamser
16	2008	The global dimension of inflation – evidence from factor-augmented Phillips curves	Sandra Eickmeier Katharina Moll
17	2008	Global business cycles: convergence or decoupling?	M. Ayhan Kose Christopher Otrok, Ewar Prasad
18	2008	Restrictive immigration policy in Germany: pains and gains foregone?	Gabriel Felbermayr Wido Geis Wilhelm Kohler
19	2008	International portfolios, capital accumulation and foreign assets dynamics	Nicolas Coeurdacier Robert Kollmann Philippe Martin
20	2008	Financial globalization and monetary policy	Michael B. Devereux Alan Sutherland
21	2008	Banking globalization, monetary transmission and the lending channel	Nicola Cetorelli Linda S. Goldberg
22	2008	Financial exchange rates and international currency exposures	Philip R. Lane Jay C. Shambaugh

23	2008	Financial integration, specialization and systemic risk	F. Fecht, H. P. Grüner P. Hartmann
24	2008	Sectoral differences in wage freezes and wage cuts: evidence from a new firm survey	Daniel Radowski Holger Bonin
25	2008	Liquidity and the dynamic pattern of price adjustment: a global view	Ansgar Belke Walter Orth, Ralph Setzer
26	2008	Employment protection and temporary work agencies	Florian Baumann Mario Mechtel, Nikolai Stähler
27	2008	International financial markets' influence on the welfare performance of alternative exchange rate regimes	Mathias Hoffmann
28	2008	Does regional redistribution spur growth?	M. Koetter, M. Wedow
29	2008	International financial competitiveness and incentives to foreign direct investment	Axel Jochem
30	2008	The price of liquidity: bank characteristics and market conditions	Falko Fecht Kjell G. Nyborg, Jörg Rocholl
01	2009	Spillover effects of minimum wages in a two-sector search model	Christoph Moser Nikolai Stähler
02	2009	Who is afraid of political risk? Multinational firms and their choice of capital structure	Iris Kesternich Monika Schnitzer
03	2009	Pooling versus model selection for nowcasting with many predictors: an application to German GDP	Vladimir Kuzin Massimiliano Marcellino Christian Schumacher

04	2009	Fiscal sustainability and policy implications for the euro area	Balassone, Cunha, Langenus Manzke, Pavot, Prammer Tommasino
05	2009	Testing for structural breaks in dynamic factor models	Jörg Breitung Sandra Eickmeier
06	2009	Price convergence in the EMU? Evidence from micro data	Christoph Fischer
07	2009	MIDAS versus mixed-frequency VAR: nowcasting GDP in the euro area	V. Kuzin, M. Marcellino C. Schumacher
08	2009	Time-dependent pricing and New Keynesian Phillips curve	Fang Yao
09	2009	Knowledge sourcing: legitimacy deficits for MNC subsidiaries?	Tobias Schmidt Wolfgang Sofka
10	2009	Factor forecasting using international targeted predictors: the case of German GDP	Christian Schumacher
11	2009	Forecasting national activity using lots of international predictors: an application to New Zealand	Sandra Eickmeier Tim Ng
12	2009	Opting out of the great inflation: German monetary policy after the breakdown of Bretton Woods	Andreas Beyer, Vitor Gaspar Christina Gerberding Otmar Issing
13	2009	Financial intermediation and the role of price discrimination in a two-tier market	Stefan Reitz Markus A. Schmidt, Mark P. Taylor
14	2009	Changes in import pricing behaviour: the case of Germany	Kerstin Stahn

15	2009	Firm-specific productivity risk over the business cycle: facts and aggregate implications	Ruediger Bachmann Christian Bayer
16	2009	The effects of knowledge management on innovative success – an empirical analysis of German firms	Uwe Cantner Kristin Joel Tobias Schmidt
17	2009	The cross-section of firms over the business cycle: new facts and a DSGE exploration	Ruediger Bachmann Christian Bayer
18	2009	Money and monetary policy transmission in the euro area: evidence from FAVAR- and VAR approaches	Barno Blaes
19	2009	Does lowering dividend tax rates increase dividends repatriated? Evidence of intra-firm cross-border dividend repatriation policies by German multinational enterprises	Christian Bellak Markus Leibrecht Michael Wild

Series 2: Banking and Financial Studies

01	2008	Analyzing the interest rate risk of banks using time series of accounting-based data: evidence from Germany	O. Entrop, C. Memmel M. Wilkens, A. Zeisler
02	2008	Bank mergers and the dynamics of deposit interest rates	Ben R. Craig Valeriya Dinger
03	2008	Monetary policy and bank distress: an integrated micro-macro approach	F. de Graeve T. Kick, M. Koetter
04	2008	Estimating asset correlations from stock prices or default rates – which method is superior?	K. Düllmann J. Küll, M. Kunisch
05	2008	Rollover risk in commercial paper markets and firms' debt maturity choice	Felix Thierfelder
06	2008	The success of bank mergers revisited – an assessment based on a matching strategy	Andreas Behr Frank Heid
07	2008	Which interest rate scenario is the worst one for a bank? Evidence from a tracking bank approach for German savings and cooperative banks	Christoph Memmel
08	2008	Market conditions, default risk and credit spreads	Dragon Yongjun Tang Hong Yan
09	2008	The pricing of correlated default risk: evidence from the credit derivatives market	Nikola Tarashev Haibin Zhu
10	2008	Determinants of European banks' engagement in loan securitization	Christina E. Bannier Dennis N. Hänsel
11	2008	Interaction of market and credit risk: an analysis of inter-risk correlation and risk aggregation	Klaus Böcker Martin Hillebrand

12	2008	A value at risk analysis of credit default swaps	B. Raunig, M. Scheicher
13	2008	Systemic bank risk in Brazil: an assessment of correlated market, credit, sovereign and inter-bank risk in an environment with stochastic volatilities and correlations	Theodore M. Barnhill, Jr. Marcos Rietti Souto
14	2008	Regulatory capital for market and credit risk interaction: is current regulation always conservative?	T. Breuer, M. Jandačka K. Rheinberger, M. Summer
15	2008	The implications of latent technology regimes for competition and efficiency in banking	Michael Koetter Tigran Poghosyan
16	2008	The impact of downward rating momentum on credit portfolio risk	André Güttler Peter Raupach
17	2008	Stress testing of real credit portfolios	F. Mager, C. Schmieder
18	2008	Real estate markets and bank distress	M. Koetter, T. Poghosyan
19	2008	Stochastic frontier analysis by means of maximum likelihood and the method of moments	Andreas Behr Sebastian Tente
20	2008	Sturm und Drang in money market funds: when money market funds cease to be narrow	Stehpan Jank Michael Wedow
01	2009	Dominating estimators for the global minimum variance portfolio	Gabriel Frahm Christoph Memmel
02	2009	Stress testing German banks in a downturn in the automobile industry	Klaus Düllmann Martin Erdelmeier
03	2009	The effects of privatization and consolidation on bank productivity: comparative evidence from Italy and Germany	E. Fiorentino A. De Vincenzo, F. Heid A. Karmann, M. Koetter

04	2009	Shocks at large banks and banking sector distress: the Banking Granular Residual	Sven Blank, Claudia M. Buch Katja Neugebauer
05	2009	Why do savings banks transform sight deposits into illiquid assets less intensively than the regulation allows?	Dorothee Holl Andrea Schertler
06	2009	Does banks' size distort market prices? Evidence for too-big-to-fail in the CDS market	Manja Völz Michael Wedow
07	2009	Time dynamic and hierarchical dependence modelling of an aggregated portfolio of trading books – a multivariate nonparametric approach	Sandra Gaisser Christoph Memmel Rafael Schmidt Carsten Wehn
08	2009	Financial markets' appetite for risk – and the challenge of assessing its evolution by risk appetite indicators	Birgit Uhlenbrock

Visiting researcher at the Deutsche Bundesbank

The Deutsche Bundesbank in Frankfurt is looking for a visiting researcher. Among others under certain conditions visiting researchers have access to a wide range of data in the Bundesbank. They include micro data on firms and banks not available in the public. Visitors should prepare a research project during their stay at the Bundesbank. Candidates must hold a PhD and be engaged in the field of either macroeconomics and monetary economics, financial markets or international economics. Proposed research projects should be from these fields. The visiting term will be from 3 to 6 months. Salary is commensurate with experience.

Applicants are requested to send a CV, copies of recent papers, letters of reference and a proposal for a research project to:

Deutsche Bundesbank
Personalabteilung
Wilhelm-Epstein-Str. 14

60431 Frankfurt
GERMANY