Essays on income distribution and macroeconomic imbalances

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Zusammenfassung

Die vorliegende Dissertation setzt sich aus vier wissenschaftlichen Einzelbeiträgen zusammen. Der gemeinsame Forschungsschwerpunkt ist die empirische Analyse des Zusammenhangs zwischen Einkommensverteilung, sektoralen Finanzierungssalden und der Leistungsbilanz.

Der erste Beitrag (Kapitel 2) untersucht den Einfluss von Veränderungen in der Einkommensverteilung auf die Entwicklung von Leistungsbilanzsalden im Vorfeld der weltweiten Finanzkrise ab 2007. Der Beitrag diskutiert den Zusammenhang zwischen der personellen Einkommensverteilung (Ungleichheit der Haushaltseinkommen) und der funktionalen Einkommensverteilung (Löhne versus Gewinne) und untersucht deren Effekte auf den Leistungsbilanzsaldo. Die Ergebnisse einer panelökonometrischen Analyse für 20 Länder für den Zeitraum 1972-2007 zeigen, dass ein Anstieg der Topeinkommensanteile (Anteil der Topeinkommen am gesamten Vorsteuereinkommen der privaten Haushalte) zu einem Rückgang des Leistungsbilanzsaldos führt, während ein Rückgang der Lohnquote (Anteil der Löhne am Bruttoinlandsprodukt) mit einem Anstieg des Leistungsbilanzsaldos einhergeht. Darüber hinaus liefert die Analyse Evidenz, dass sich die Topeinkommensanteile hauptsächlich über einen negativen Effekt auf den Finanzierungssaldo des privaten Haushaltssektors auf den Leistungsbilanzsaldo auswirken, während die Lohnquote die Finanzierungssalden des privaten Haushaltssektors (positiv) und des Unternehmenssektors (negativ) beeinflusst. Der Beitrag verdeutlicht, dass Veränderungen in der personellen und funktionalen Einkommensverteilung erheblich zur Entstehung von Leistungsbilanzungleichgewichten in mehreren großen Volkswirtschaften im Vorfeld der weltweiten Finanzkrise beitrugen. Dabei wiesen die Länder mit den größten Rückgängen des Leistungsbilanzsaldos (USA, Vereinigtes Königreich) starke Anstiege der Topeinkommensanteile bei gleichzeitig relativ geringen Veränderungen der Lohnquote auf. Zugleich fallen in den Ländern mit den größten Anstiegen des Leistungsbilanzsaldos (China, Deutschland, Japan) die starken Rückgänge der Lohnquote bei verhältnismäßig schwachen Anstiegen der Topeinkommensanteile auf. Mögliche theoretische Erklärungen der Ergebnisse liefern Ausgabenkaskaden, ausgelöst durch einen Anstieg der personellen Einkommensungleichheit in Ländern mit Leistungsbilanzdefiziten, sowie Unterkonsumtion infolge einer rückläufigen Lohnquote in Ländern mit Leistungsbilanzüberschüssen.

Der zweite Beitrag (Kapitel 3) analysiert die Bedeutung der Einkommensverteilung für die Entstehung nationaler Wachstumsmodelle und makroökonomischer Ungleich-

gewichte. Dabei stellt sich einerseits die Frage, wie unterschiedliche Ausprägungen in der Einkommensverteilung in einzelnen Ländern seit den 1980er Jahren unterschiedliche Wachstumsmodelle hervorgebracht haben, die sich durch Leistungsbilanzdefizite in liberalen Marktwirtschaften und Leistungsbilanzüberschüsse in koordinierten Marktwirtschaften kennzeichnen. Andererseits sind die unterschiedlichen Wachstumsmodelle möglicherweise auf Unterschiede in der Koordinierung von Lohnverhandlungen zwischen den Ländern und im zeitlichen Verlauf zurückzuführen, die sich entweder direkt auf den Leistungsbilanzsaldo oder indirekt auf die Einkommensverteilung auswirken können. Dieser Beitrag analysiert die relative Bedeutung von Lohnkoordinierung und Einkommensverteilung für die Entstehung globaler Leistungsbilanzungleichgewichte für 18 Industrieländer für den Zeitraum 1981-2007. Die Ergebnisse verdeutlichen, dass der starke Anstieg der Topeinkommensanteile in wichtigen liberalen Marktwirtschaften zu einem Rückgang des Leistungsbilanzsaldos beitrug, während der Rückgang der Lohnquote in koordinierten Marktwirtschaften zu einer Schwächung der Binnennachfrage und einem Anstieg des Leistungsbilanzsaldos führte. Die Koordinierung der Lohnverhandlungen scheint zwar lediglich eine begrenzte direkte Rolle für die Entstehung von Leistungsbilanzungleichgewichten im Vorfeld der weltweiten Finanzkrise zu spielen, insbesondere wenn die Effekte der Einkommensverteilung berücksichtig werden. Allerdings liefert die Analyse Anhaltspunkte, dass die Lohnkoordinierung den Leistungsbilanzsaldo in einzelnen Ländern indirekt über Effekte auf die personelle und funktionale Einkommensverteilung beeinflusste.

Im dritten Beitrag (Kapitel 4) wird die Rolle des Unternehmenssektors für die Entstehung von Leistungsbilanzungleichgewichten untersucht. Nach dem Standardmodell intertemporal optimierender Haushalte mit rationalen Erwartungen hat das Sparverhalten des privaten Unternehmenssektors und des öffentlichen Sektors keinen Einfluss auf die aggregierte Ersparnis und den Leistungsbilanzsaldo. Eine Veränderung im Sparverhalten der Unternehmen führt allerdings zu einer Veränderung des Leistungsbilanzsaldos, sofern die privaten Haushalte nicht in der Lage sind, den „Unternehmensschleier" vollständig zu durchdringen. Das bedeutet, dass Veränderungen der Unternehmensersparnis nicht durch entsprechend gegenläufige Veränderungen der Haushaltsersparnis kompensiert werden. Dieser Mechanismus ist konzeptionell vergleichbar mit dem Sparverhalten „nicht-ricardianischer" Haushalte. Während empirische Leistungsbilanzanalysen nicht-ricardianische Effekte jedoch üblicherweise durch den staatlichen Budgetsaldo als erklärende Variable einbeziehen, wurden mögliche Leistungsbilanzeffekte einer unvollständigen Durchdringung des Unternehmensschleiers durch die privaten Haushalte in der bestehenden Literatur bisher nicht berücksichtigt. Die Ergebnisse einer panelökonometrischen Analyse für 25 Länder für den Zeitraum 1980-2015 zeigen, dass ein Anstieg im Finanzierungssaldo des Unternehmenssektors mit einem Anstieg des Leistungsbilanzsaldos einhergeht. Die Größenordnung dieses Effekts ist vergleichbar mit dem ei-

ner Veränderung des staatlichen Budgetsaldos auf den Leistungsbilanzsaldo. Aus der Analyse geht zudem hervor, dass sich insbesondere die Leistungsbilanzeffekte von Veränderungen im Sparverhalten des Unternehmenssektors als robust gegenüber verschiedenen Modell-Spezifikationen und Schätzmethoden erweisen. Die Ergebnisse lassen darauf schließen, dass die Ersparnisbildung im Unternehmenssektor makroökonomische Trends beeinflusst und erheblich zur Entstehung von globalen Leistungsbilanzungleichgewichten beitrug.

Der vierte Beitrag (Kapitel 5) untersucht den Einfluss von Veränderungen in der funktionalen Einkommensverteilung auf das Spar- und Investitionsverhalten im Unternehmenssektor. In den vergangenen Jahrzehnten stieg der Finanzierungssaldo des Unternehmenssektors in mehreren großen Volkswirtschaften deutlich an, so dass diese teilweise erhebliche Finanzierungsüberschüsse aufweisen. Dieses Phänomen ist historisch eher ungewöhnlich, da der Unternehmenssektor innerhalb einer Volkswirtschaft traditionell Nettoschuldner ist. Der vorliegende Beitrag verdeutlicht, dass der funktionalen Einkommensverteilung eine wichtige Bedeutung für die Erklärung von Trends im Unternehmenssektor zukommt. Eine panelökonometrische Analyse für 40 Länder für den Zeitraum 1990-2016 zeigt, dass ein Anstieg der Profitquote zu einem höheren Finanzierungssaldo des Unternehmenssektors führt. Die Profitquote beeinflusst den Finanzierungssaldo des Unternehmenssektors hauptsächlich durch einen positiven Effekt auf die Unternehmensersparnis, wohingegen der Effekt auf die Investitionen eher klein ist. Eine zentrale Herausforderung der empirischen Analyse besteht darin, den zugrundeliegenden Mechanismus der aufgezeigten Zusammenhänge näher zu beleuchten. Dieser Beitrag diskutiert insbesondere die Rolle von Kapitalkosten und untersucht, inwiefern Veränderungen der relativen Preise von Investitionsgütern, der Körperschaftsteuern und der Realzinsen zum Anstieg im Finanzierungssaldo des Unternehmenssektors beitrugen. Die Ergebnisse liefern allerdings kaum Anhaltspunkte, dass Veränderungen in den Kapitalkosten die zunehmenden Unternehmensgewinne und den Anstieg im Finanzierungssaldo des Unternehmenssektors der einzelnen Länder in den vergangenen Jahrzehnten vollständig erklären können. Die Ergebnisse verdeutlichen vielmehr, dass dem Zusammenhang zwischen der funktionalen Einkommensverteilung und dem Finanzierungssaldo des Unternehmenssektors möglicherweise andere Faktoren, wie etwa der abnehmende Wettbewerb und der damit einhergehende Anstieg der Markups, zugrunde liegen.

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Chapter 1

Introduction

The global current account imbalances have been at the forefront of recent academic and policy-oriented debates. They are widely considered to be an important contributing factor to the instability of the international economic system in the period leading up to the global financial crisis starting in 2007 (e.g. Caballero et al., 2008; Blanchard and Milesi-Ferretti, 2009; Obstfeld and Rogoff, 2010; Palley, 2012). However, it has so far proven difficult to explain the emergence and persistence of the global current account imbalances in a fully satisfactory manner (Phillips et al., 2013; Chinn et al., 2014). There is no consensus to date as to the underlying causes of this phenomenon, and existing empirical analyses have failed to explain the widening of current account balances during the decade or so before the global financial crisis with standard fundamentals.

In recent years, there has also been a revival of interest among economists for the potentially destabilizing macroeconomic effects of income distribution. For instance, Rajan (2010) argues that bottom and middle income households in the United States were able, prior to the financial crisis, to sustain their consumption relative to top income households despite declining relative (permanent) incomes, facilitated through government credit expansion policies. According to Rajan (2010), rising inequality thus played an important role in explaining the decrease in national saving and the unsustainable rise in personal debt and, by consequence, the rising current account deficit in the United States. On the other hand, Pettis (2013) argues that the persistent current account surpluses of China and Germany, the two countries with the largest current account surpluses worldwide before the crisis, are not primarily the result of household thriftiness, but rather of low wages and household income (relative to profits and corporate income) leading to weak aggregate consumption relative to domestic production.

The aim of this dissertation is to contribute to the understanding of the macroeconomic effects of income distribution by studying the link between income distribution and the current account from a sectoral perspective. The current account balance is defined as the difference between domestic saving and domestic investment or equivalently as the sum of the financial balances (income minus expenditure, or saving minus investment) of the private household, the corporate, and the government sectors. The sectoral accounting perspective provides a simple and powerful analytical framework to analyze

the functional chains linking income distribution and the current account. The different chapters of this dissertation look at how changes in income distribution affect the financial balances of different sectors of the economy, and how changes in sectoral balances are related to current account dynamics.

In the academic literature, the macroeconomic effects of income distribution have been approached in two broad ways, focusing on either the distribution of income across households (personal income distribution) or the distribution across types of income or sectors (functional income distribution). The demand effects of income distribution are theoretically ambiguous. According to standard models of rational household behavior, neither the personal nor the functional distribution of income should have an effect on aggregate saving and investment, and hence the current account balance. In models with heterogeneous households, higher personal income inequality can lead to either higher or lower spending on goods and services. For example, in simple Keynesian models and life-cycle models where rich households have a higher preference for wealth (Carroll, 1998; Dynan et al., 2004), a higher inequality of lifetime incomes should lead to higher saving. By contrast, in models with positional externalities in goods and services, a rise in inequality can lead to "trickle-down consumption", or "expenditure cascades", *i.e.* depress the (financial) savings of those households that see their relative incomes decline (Frank et al., 2014; Bertrand and Morse, 2016). Shifts in the distribution of income between the household and the corporate sector may also affect aggregate demand. If households fail to see through the "corporate veil", then a rise in corporate saving will be less than fully offset by lower household saving. A fall in the share of wages in the national income can either increase or reduce aggregate demand. According to the traditional "underconsumption" view, capitalists (firms) have a lower propensity to spend than workers (households) so that a fall in the wage share reduces aggregate demand (Hobson, 1909; Lavoie and Stockhammer, 2013; Pettis, 2013). On the other hand, higher profitability may also boost investment (Kumhof et al., 2012; Lavoie and Stockhammer, 2013; Gruber and Kamin, 2016).

The contribution of this dissertation is to empirically analyze the link between income distribution, sectoral financial balances, and the current account. Firstly, it examines the relationship between the personal and the functional distribution of income which may have rather different implications for aggregate demand and the current account. Secondly, it analyzes the importance of different sectors of the economy for current account balances and tests whether households are able to fully pierce the institutional veils of the corporate and the government sector. Thirdly, it investigates how changes in the personal and the functional income distribution affect the saving and investment decisions of the household and the corporate sector, and hence the current account. Finally, it shows how different growth regimes are linked to different patterns of personal and functional income distribution, and how differences in wage bargaining institutions contribute to

explaining these different patterns of income distribution.

Chapter 2 analyzes how changes in the personal and the functional income distribution affect current account balances during the period leading up to the global financial crisis starting in 2007. The chapter contributes to filling a gap in the literature, which so far has focused either on the personal income distribution or the functional income distribution and their effects on different measures of saving or investment. We analyze the relationship between personal and functional income distribution and disentangle their effects on the current account based on a panel estimation analysis for a sample of 20 countries for the period 1972-2007. The results show that a rise in top-end income inequality leads to a lower current account. By contrast, a fall in the wage share leads to an increase in the current account. There is also tentative evidence that (top-end) income inequality affects current account positions mainly through its negative effect on household net lending, whereas the wage share affects both household net lending (positively) and corporate net lending (negatively). Finally, we show that the relative contributions of (changes in) personal income inequality and the wage share to (the widening of) the current account positions of a number of large economies prior to the global financial crisis were considerable. Interestingly, the most important current account deficit countries, such as the United Kingdom or the United States, combined strongly rising top-end income inequality with relatively small changes in the wage share. By contrast, the most important current account surplus countries, such as China, Germany, or Japan, experienced strong decreases in the wage share, but relatively little changes in top-end income inequality. While different theoretical explanations of our results are possible, they are consistent with trickle-down consumption triggered by rising top-end income inequality in the main current account deficit countries and underconsumption linked to falling wage shares in the main current account surplus countries.

Chapter 3 studies the link between income distribution, national growth regimes, and macroeconomic imbalances. The chapter starts from the observation that different groups of countries, despite confronting similar paths of technological change and globalization as well as financial and labor market liberalization, experienced rather different patterns of income distribution, with top-end personal income inequality increasing much more in liberal market economies and wage shares decreasing considerably more strongly in coordinated market economies. We ask, firstly, how are these differences in income distribution related to the emergence, since the 1980s, of different growth models that have been characterized by current account surpluses in coordinated market economies and current account deficits in liberal market economies? And secondly, what has been the role of differences in the coordination of wage bargaining across countries and over time in bringing about the different growth models by impacting either directly on the current account balance or indirectly on the distribution of income? We contribute to answering these questions using a macro panel analysis of 18 industrialized countries over the pe-

riod 1981-2007. In particular, we use current account regressions to analyze the relative importance of wage coordination and income distribution in explaining the emergence of global imbalances prior to the global financial crisis. We find that strongly rising top income shares contributed to the decline in current account balances in major liberal market economies, whereas pronounced falls in the wage share contributed to the weakness of domestic demand and rising current account surpluses in coordinated market economies. Our results further suggest that the coordination of wage bargaining played only a limited direct role in the emergence of current account imbalances, when the effect of income distribution is accounted for. However, we find tentative evidence that wage bargaining coordination affects the patterns of income distribution in different countries.

Chapter 4 analyzes how changes in corporate sector behavior affect national current account balances. The chapter is motivated by the observation that, from a sectoral perspective, differences in the net lending behavior of the corporate sector are an important distinguishing feature of current account surplus and deficit countries in the recent past. At the theoretical level, the standard model of intertemporally optimizing households with rational expectations predicts that the saving behavior of the non-household sectors has no influence on total saving and the current account. In particular, to the extent that households own domestic corporations, household saving behavior should offset changes in corporate saving. However, a change in corporate saving leads to a change in the current account if private households fail to see through the corporate veil, *i.e.*, if changes in corporate saving are not fully offset by changes in household saving. This mechanism is conceptually similar to non-Ricardian saving behavior by households, which implies that a change in government saving leads to a change in aggregate saving, and hence the current account. While most current account estimations routinely test for non-Ricardian effects by introducing the fiscal balance as an explanatory variable, the potential current account effects linked to incomplete piercing of the corporate veil have not been systematically addressed in the existing literature. Using a sample of 25 countries for the period 1980-2015, we find significant effects of changes in the corporate sector variables (the corporate financial balance or corporate saving and investment separately) on the current account balance, which are of the same order of magnitude as the effect of a change in the fiscal balance. We show that taking account of corporate sector behavior significantly improves our understanding of the current account. The chapter thus adds to the increasing recognition of the non-household sectors as shaping macroeconomic dynamics beyond the control of decisions made by the household sector.

Against this background, Chapter 5 characterizes recent trends in corporate saving and investment behavior based on national accounts data and analyzes their relationship with changes in factor shares. We document that the corporate sector has moved from a net borrowing position to a net lending position in major advanced countries over the past decades. Contrary to common belief, the rise in corporate net lending started well

before the outbreak of the global financial crisis. Moreover, the pre-crisis shift in corporate net lending was largely driven by a secular upward trend in corporate saving while corporate investment remained relatively stable. Using a panel estimation analysis for a sample of 40 countries for the period 1990-2016, we present evidence that factor shares are an important driver of trends in the corporate sector. We find that the profit share affects corporate net lending mainly through its positive effect on corporate saving whereas the effect on corporate investment is found to be limited. This implies that an increase in profits raises corporate saving more than corporate investment. Furthermore, we analyze the role of changes in the cost of capital for the link between factor shares and trends in the corporate sector. We provide an empirical test for the relevance of this channel and examine whether changes in the relative price of investment goods, corporate income taxes, and the real interest rate have contributed to an increase in corporate saving above investment. Overall, there is only limited evidence that changes in the cost of capital fully account for the increase in corporate profits and the rising corporate net lending positions across countries in recent decades. In particular, the corporate saving effects of the profit share are unlikely to be the result of a substitution away from labor and toward capital arising from a decline in the cost of capital. Our results rather suggest the possibility that other factors, such as the decreased competition leading to higher markups, might explain the link between the profit share and the corporate financial balance.

In summary, this dissertation provides important new insights about the relationship between the personal and the functional income distribution on the one hand, and sectoral financial balances and the current account on the other hand. The results of this dissertation suggest that shifts in income distribution have significant explanatory power for the understanding of macroeconomic dynamics. In particular, changes in personal and functional income distribution have contributed considerably to the widening of current account balances, and hence to the instability of the international economic system, prior to the global financial crisis. As an overall conclusion, it is fair so say that there have been two different, but equally unstable growth models which are partly related to different trends in income distribution. In the United Kingdom and the United States, strongly rising top-end income inequality appears to have triggered a pronounced decline in household net lending and contributed to the unsustainable rise in household debt and large current account deficits. In China, Germany, and Japan, top-end income inequality has increased far less, but the falling share of the national income going to wages appears to have weakened aggregate demand and contributed to the current account surpluses in these countries, primarily by raising corporate net lending. This implies that adjustments in the distribution of income may have to play a key role in achieving the macroeconomic conditions for more stable national growth models.

Chapter 2

Income distribution and the current account[1]

2.1 Introduction

The global current account imbalances are widely considered to be an important contributing factor to the global financial crisis starting in 2007. However, it has so far proven difficult to explain the emergence and persistence of the global imbalances in a fully satisfactory manner (Phillips et al., 2013; Chinn et al., 2014). In recent years, there has also been a revival of interest among economists for the potential link between income distribution and macroeconomic imbalances. Rajan (2010) argues that bottom and middle income households in the United States (U.S.) were able, prior to the financial crisis, to sustain their consumption relative to top income households despite declining relative (permanent) incomes, facilitated through government credit expansion policies. According to Rajan (2010), rising inequality thus played an important role in explaining the decrease in U.S. national saving and the unsustainable rise in personal debt and, as a consequence, the rising U.S. current account deficit. Similar arguments can be made for the case of the United Kingdom (U.K.) (Kumhof et al., 2012). On the other hand, Pettis (2013) forcefully argues that the persistent current account surpluses of China and Germany, the two countries with the largest current account surpluses worldwide before the crisis, were not primarily the result of household thriftiness, but rather of low wages relative to profits leading to weak aggregate consumption relative to domestic production (see also van Treeck and Sturn, 2012).

Whereas the above discussion suggests that both the personal and the functional distribution of income may affect the stability of the international economic system as a whole, the academic literature has been remarkably silent on the potential relationship between changes in income distribution and the pre-crisis current account imbalances. Rather, most previous work has focused more narrowly on the implications of income distribution for either private consumption or private investment. Moreover, the potentially rather different implications of the functional and the personal distribution of income for aggregate demand and the current account are rarely discussed in a systematic fash-

[1] This chapter is based on joint work with Till van Treeck. An earlier version of this chapter was published as "Income distribution and the current account", *Journal of International Economomics* **114**(C), 238-254, see Behringer and van Treeck (2018).

ion. This gap in the literature is all the more noteworthy as the relationship between factor shares, *i.e.*, the shares of wages and capital in the national income, and personal income inequality, *i.e.*, the distribution of income across households or individuals, has been at the forefront of recent advances in inequality research (Piketty et al., 2018). The present chapter contributes to the analysis of the macroeconomic effects of changes in factor shares and personal income inequality.

The demand effects of income distribution are theoretically ambiguous. According to standard models of rational household behavior, neither the personal nor the functional distribution of income should have an effect on aggregate saving and investment, and hence the current account balance. In models with heterogeneous households, higher personal income inequality can lead to either higher or lower spending on goods and services. For example, in simple Keynesian models and in life-cycle models where rich households have a higher preference for wealth (Carroll, 1998; Dynan et al., 2004), a higher inequality of lifetime incomes should lead to higher saving. By contrast, in models with positional externalities in goods and services, a rise in inequality can lead to "trickle-down consumption", or "expenditure cascades", *i.e.*, depress the (financial) savings of those households that see their relative incomes decline (Frank et al., 2014; Bertrand and Morse, 2016).

A fall in the share of wages in the national income, *i.e.*, a change in the functional distribution of income, can either increase or reduce aggregate demand. According to the traditional "underconsumption view", capitalists (firms) have a lower propensity to spend than workers (households) so that a fall in the wage share reduces aggregate demand (Hobson, 1909; Lavoie and Stockhammer, 2013; Pettis, 2013; Grigoli et al., 2018). On the other hand, higher profitability may also boost investment (Kumhof et al., 2012; Lavoie and Stockhammer, 2013; Gruber and Kamin, 2016).

The contribution of the present chapter is to analyze the current account effects of income distribution for a sample of 20, mainly industrialized, countries for the period 1972-2007. We analyze the relationship between personal and functional income distribution in our sample, before trying to disentangle their effects on the current account. Our main findings are as follows: Firstly, a rise in top-end income inequality (relative to trading partners) leads to a lower current account, controlling for a set of standard determinants of current account balances. Secondly, a fall in the share of wages in national income leads to an increase in the current account. Thirdly, there is also tentative evidence that (top-end) income inequality has affected current account positions mainly through its negative effect on household net lending, whereas the wage share has affected both household net lending (positively) and corporate net lending (negatively). Finally, we show that the relative contributions of (changes in) personal income inequality and the wage share to (the widening of) the current account positions of a number of large economies prior to the global financial crisis were considerable. Interestingly, the quanti-

tatively most important current account deficit countries (U.S., U.K.) combined strongly rising top-end income inequality with relatively small changes in the wage share. By contrast, the most important surplus countries (China, Germany, Japan) experienced strong decreases in the wage share, but relatively little changes in top household income shares. While we remain agnostic as to the underlying theoretical explanations of our findings, they are consistent with trickle-down consumption triggered by rising top-end income inequality in the main current account deficit countries and underconsumption linked to falling wage shares in the main surplus countries. We expressly limit our focus of attention to the pre-crisis period. Clearly, the global financial crisis both has revealed the unsustainability of national current account positions and thus has fundamentally changed the saving and spending patterns of households, corporations, and governments.

The remainder of this chapter is structured as follows. In Section 2.2, we review competing hypotheses discussed in the literature about the macroeconomic effects of income distribution and its implications for the current account. Section 2.3 discusses important stylized facts about income distribution, sectoral financial balances, and the current account in some selected large economies. Section 2.4 presents the empirical analysis. Section 2.5 concludes.

2.2 Competing hypotheses about the macroeconomic implications of income distribution

2.2.1 Missing variables in current account estimations?

In face of the widening of current account imbalances especially since the late 1990s and prior to the global financial crisis starting in 2007, a number of competing hypotheses have been put forward (see Chinn et al., 2011, for a survey). These include the twin deficit hypothesis that current accounts are driven by government deficits (Abbas et al., 2011; Bluedorn and Leigh, 2011; Kumhof and Laxton, 2013); the savings-glut hypothesis that high savings in emerging markets are responsible for their current account surpluses (Chinn and Ito, 2007); the demographic hypothesis that population structure and life-cycle savings dynamics have contributed to the current account imbalances (Cooper, 2008); the asset bubble explanation that wealth effects are the main force behind saving-investment imbalances (Fratzscher and Straub, 2009); the financial-development argument that countries with deeper financial markets attract foreign saving flows resulting in current account deficits (Gruber and Kamin, 2007; Caballero et al., 2008); and the structural policy hypothesis that product and labor market regulations are important drivers of current accounts (Kerdrain et al., 2010). However, there is as of yet no consensus as to what explains the emergence and persistence of the global imbalances during the period leading up to the global financial crisis starting in 2007. Chinn et al. (2011, p. 18) suggest

the possibility of missing variables in existing estimation models.

Few authors have approached the issue of global imbalances with an explicit focus on income distribution. In the remainder of this Section we review the existing literature on how changes in the personal and the functional income distribution may affect saving and investment.

2.2.2 Personal income distribution

Standard life-cycle and permanent income models with rational expectations predict that the distribution of (the permanent component of) income and aggregate saving will be unrelated in the presence of standard preferences. By contrast, the traditional Keynesian view is that rising income inequality across households will be a drag on aggregate demand and thus lead to a higher current account, to the extent that high income households have a lower marginal propensity to spend than low income households. Leigh and Posso (2009, p. 58) argue that "[i]f the rich save more than the poor, then a mean-preserving transfer from poor to rich would raise aggregate saving rates." Yet, while the view that "the rich save more than the poor" (out of lifetime income) is both intuitively appealing and empirically relevant (Dynan et al., 2004), the effects of a change in income inequality on saving are *a priori* undetermined.

In life-cycle models with bequests, a higher income share of rich households should result in higher saving and lower consumption, because bequests are a luxury (Carroll, 1998). Income inequality may also positively affect saving through the precautionary saving motive (Carroll and Kimball, 1996), wealth in the utility function (Zou, 1995), or different degrees of patience across income groups (Mankiw, 2000). By contrast, in the presence of positional externalities in consumption (Frank, 2007), households with declining relative incomes may reduce their saving by such an extent as to overcompensate the increased saving of the richer households. In particular, the expenditure cascades model by Frank et al. (2014) which seeks to explain the rise in U.S. household expenditure-to-income ratio as a result of rising income inequality since the early 1980s is based on the notion that "people generally look to others above them on the income scale rather than to those below" (Frank et al., 2014, p. 7). Similarly to Rajan (2010), an implication of the expenditure cascade hypothesis is that growing income inequality may contribute to a lower current account via its negative effects on household net lending. In a recent version of Kumhof et al. (2012), a somewhat different explanation of the negative saving effects of top-end income inequality is offered: When higher top income arises on traded financial assets, it can have large wealth effects relative to income effects. This, in turn, may induce top income households to borrow more, including from the rest of the world.

In empirical works, different measures of saving or net lending have been used. Dy-

nan et al. (2004) derive various measures of household saving from different household surveys. They find a strong positive relationship between personal saving rates and lifetime income for the U.S. Bertrand and Morse (2016) show that non-rich households in the U.S. consume a larger share of their current income when exposed to higher top income and consumption levels, which is consistent with status-maintaining explanations (trickle-down consumption). They conclude that the personal saving rate in 2005, which was 1.5%, would have been between 3.5% and 3.9% if top income levels had grown at the same rate as the median income since the 1980s. Several analyses also find evidence of a positive relationship between income inequality and private household debt or other measures of financial distress (Iacoviello, 2008; Cynamon and Fazzari, 2008; Mian and Sufi, 2009; Frank et al., 2014). Other studies have used macroeconomic panel data to study the effects of inequality on private or national saving, with mixed results (Edwards, 1996; Schmidt-Hebbel and Serven, 2000; Leigh and Posso, 2009; Gu et al., 2015). Very few studies estimate the effects of income inequality on the current account directly. Kumhof et al. (2012) use top 1% and top 5% household income shares and find a negative relationship between top-end income inequality and the current account in a panel regression analysis for 14 OECD countries for the period 1968-2008.

2.2.3 Functional income distribution

The effects of changes in the distribution between wages and profits on saving and investment, and hence the current account, are theoretically ambiguous. Post-Keynesian models stress the positive effect of the profit share on the aggregate saving rate based on the observation that workers save less than capitalists (see Grigoli et al., 2018 for a discussion). But if a higher share of national income going to profits also boosts investment by raising expected profitability or easing liquidity constraints, the national saving-investment balance may remain unaffected or even decrease (see also Kumhof et al., 2012; Lavoie and Stockhammer, 2013).

Pettis (2013) refers to the traditional underconsumption argument that a fall in the share of wages or household income in national income will reduce both consumption and aggregate demand because households have a higher marginal propensity to spend their income than firms. In Classical theories, a common fear was that a falling share of wages in national income would lead to insufficient aggregate demand and oversaving due to a lack of purchasing power of the "consuming classes" (e.g. Hobson, 1909). However, as emphasized by the relative income hypothesis (Duesenberry, 1949) and theories of habit persistence (Marglin, 1984), a fall in (the rate of growth of) income, which may be due to a fall in the wage share, may also induce households to lower their saving rate. In a more recent model by Kumhof et al. (2012), firms are owned predominantly by top income households, who have wealth in the utility function and a lower marginal

propensity to spend on goods and services than low income households. In such a context, a rise in the share of corporate profits in national income can also have saving and aggregate demand effects.

Karabarbounis and Neiman (2014) and Chen et al. (2017) document the global decline in the labor share and the global rise in corporate saving since the early 1980s. Given the relative constancy in the sectoral composition of investment, the rise in corporate saving implies an improvement in the corporate net lending position. The authors do not, however, analyze cross-country differences in the functional income distribution and corporate net lending positions. Similarly, André et al. (2007) argue that the rise in corporate saving was mainly driven by increasing profit shares in most countries, possibly related to a degree of wage moderation. Gruber and Kamin (2016) find a positive effect of profits on investment in some of their estimations for the U.S., but the estimated effect is small. They conclude that "corporate saving glut" could have considerable consequences for external imbalances around the world. While the lack of attention to corporate net lending as a potential driver of macroeconomic trends has recently been noted in the literature (Bebczuk and Cavallo, 2016; Gruber and Kamin, 2016), the implications of the functional income distribution for corporate net lending and current account balances has not been systematically analyzed within a macro panel analysis.

2.2.4 Functional and personal income distribution

The aim of this chapter is to analyze how changes in the personal and the functional income distribution affect current account balances. We thus contribute to filling a gap in the macroeconomics literature, which so far has focused either on the personal income distribution or the functional income distribution and their effects on different measures of saving or investment. Moreover, the existing literature has not always been very clear on the relationship between the functional and the personal distribution of income.

In Kumhof et al. (2012), whose approach is closest to our own with its focus on the current account, the personal and the functional income distribution are conflated in the theoretical model, whereas the empirical analysis relies solely on measures of personal income inequality. In the theoretical model, there are two heterogeneous agents, "investors" and "workers". Investors represent both the corporate sector and top income households. Investors' utility function unlike that of workers includes a wealth-in-the-utility-function term. Loans to workers from domestic and foreign investors support aggregate demand and result in current account deficits, following shocks to income inequality and financial liberalization. A rise in the share of income going to investors also leads to a corporate investment boom due to a higher return on investment, which importantly contributes to the decrease in the current account. While interesting, the model does not square well with a number of empirical observations. Firstly, investment booms

are difficult to find in the U.S. and U.K. data which rather point to "saving droughts" (Chinn et al., 2011) for the pre-crisis period. Secondly, in the empirical calibration and estimation of the model, investors' income share is proxied using the top 5% household income share, *i.e.*, a measure of personal income inequality. What is, therefore, lacking is a clear distinction between changes in the personal and the functional distribution of income, which may have different effects on the saving and investment decisions of the household and the corporate sector, and hence the current account.

Atkinson (2009) and Bengtsson and Waldenström (2018), amongst others, analyze the relation between factor shares and personal income inequality (without discussing their impact on the current account or other macroeconomic variables). The main message of these contributions is that for plausible levels of the profit share and characterizations of personal incomes, the profit share and personal income inequality can be expected to be positively correlated. Similarly, Piketty (2014) emphasizes the connection between the capital share and income inequality: capital income tends to be more unequally distributed than labor income, so a transfer from labor income to capital income will increase inequality. One might thus ask whether measures of the profit share and of personal income inequality could be used interchangeably in current account estimations.

A standard approach to analyzing the effects of changes in factor shares on the personal income distribution is to consider a simple decomposition of the squared coefficient of variation of income, V_y^2, where there are two types of income: wage income (subscript w) and capital income (subscript k).[2] Capital's share of value added is denoted by α, with the wage share being $1-\alpha$. The overall inequality is then written as a function of the share of capital income, of the inequality of wage income (V_w), of the inequality of capital income (V_k), and of the correlation ρ between wage income and capital income:

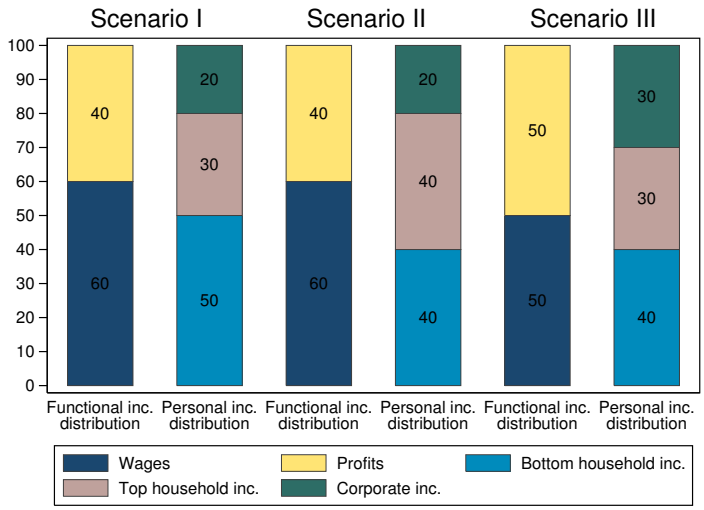
$$V_y^2 = (1-\alpha)V_w^2 + \alpha V_k^2 + 2(1-\alpha)\alpha\rho V_w V_k \tag{2.1}$$

Now, an increase in the share of capital income leads to a rise in overall income inequality, whenever $\alpha > (1\text{-}\lambda\,\rho)/(1 + \lambda^2 \text{ - } 2\,\lambda\,\rho)$ where $\lambda = V_k/V_w$. Because in practice capital income is much more dispersed than wage income ($\lambda > 1$) and the correlation between wage income and capital income is positive ($\rho > 0$), the critical value for an increase in the capital share to increase personal income inequality is likely to be small. Based on this analytical framework, Bengtsson and Waldenström (2018) regress top household income shares on aggregate profit shares in a panel analysis for 16 industrialized economies. They conclude that the profit share and top-end income inequality are positively correlated and that the capital-labor split is an important determinant of inequality, thus confirming the argument of Piketty (2014).

[2]See Atkinson and Bourguignon (2000), Atkinson (2009) and, more recently, Bengtsson and Waldenström (2018).

There are two main issues with this analysis. Firstly, it neglects the fact that not all capital income is distributed to households. In particular, profits retained by corporations are not captured by standard measures of personal income inequality (Piketty et al., 2018). Formally, V_k in Equation 2.1 cannot be interpreted as the coefficient of variation of total capital income, but rather as the coefficient of variation of that part of total capital income that is distributed to households. Secondly, the analysis based on Equation 2.1 suggests that changes in factor shares are exogenous and that changes to factor shares cause changes in personal income inequality. In fact, it may depend largely on country-specific corporate governance and wage bargaining institutions whether distributional shocks will be reflected primarily in factor shares or personal income inequality. In particular, a fall in the share of national income going to the bottom of the distribution may be associated with either a rise in the share of corporate retained profits or an increase in the share of top household income.

Figure 2.1: Functional and personal income distribution



By way of illustration, Figure 2.1 uses a hypothetical example of a private economy (with no government) to show the relation between the functional and the personal distribution of income. In Scenario 1, the wage share is 60%, and the profit share is 40% of the national income. 20% of the national income are retained profits (*i.e.* corporate saving), 80% of the national income accrues to the household sector. The share of top household incomes in the national income is 30%. This implies that the share of investors, as defined by Kumhof et al. (2012), in the national income is 50%, *i.e.*, the sum of retained profits and top household incomes. In Scenario 2, the wage and profit shares and retained profits remain constant, but the top household income share increases. In Scenario 3, top household incomes remain constant but the profit share is higher than in the two previ-

ous Scenarios. Corporate saving increases together with the profit share, at the expense of bottom household incomes. Notice that the top household income share is lower in Scenario 3 than in Scenario 2, even though the income share of investors (in the definition by Kumhof et al., 2012) is exactly the same.

Data limitations do not allow us to produce estimates of the investor income share in the definition by Kumhof et al. (2012) for the various countries in our sample. This is, however, the research agenda proposed by Piketty et al. (2018) who attempt at building distributional national accounts that capture 100% of national income, which make it possible to compute income shares for each quantile of the income distribution consistent with macroeconomic national accounts data. This makes it necessary, in particular, to integrate the distribution of household income and the distribution of non-household income. For the purposes of the present contribution, however, it is important to notice that changes in the distribution of income within the household sector (Scenario 2 of Figure 2.1) and changes in the functional income distribution (Scenario 3 of Figure 2.1), may have rather different macroeconomic implications, as discussed above.

The empirical relevance of the distinction between functional and personal income distribution can be demonstrated with reference to the analysis by Kumhof et al. (2012). Following a common practice in the literature, the authors distinguish two groups of countries according to the evolution of top household income shares throughout the 20th century: a first group, largely consisting of Anglo Saxon countries where top household income shares have followed a U-shaped pattern, showing a strong secular increase since the early 1980s; and a second group of countries, including many European countries and Japan, where top income shares have followed an L-shaped pattern, *i.e.*, showing no (or a more limited) increase in recent decades (Piketty and Saez, 2006). Yet, this approach neglects the distribution of income between wages and profits, or between the private household and corporate sectors. As we show in the next Section, the aggregate wage share has fallen especially strongly in a number of countries that may be characterized as following an L-shaped pattern of top-end income inequality. The model by Kumhof et al. (2012), therefore, may be well suited to capture the cases of the U.S. and the U.K., where strongly rising top-end income inequality appears to have contributed to the decline in household saving and the current account prior to the financial crisis of 2008. It cannot, however, establish a link between the strong decline in the wage share and the weak domestic demand that could be observed in such large current account surplus countries as China, Germany, and Japan. In these countries, the rise in top-end personal income inequality was much more subdued than in the Anglo Saxon countries.

2.3 The data

This Section discusses the stylized facts of income distribution and current account balances. We focus primarily on the G7 economies and China. These eight countries accounted for more than 60% of global GDP in 2007.

Figure 2.2: Current account balances, G7 and China

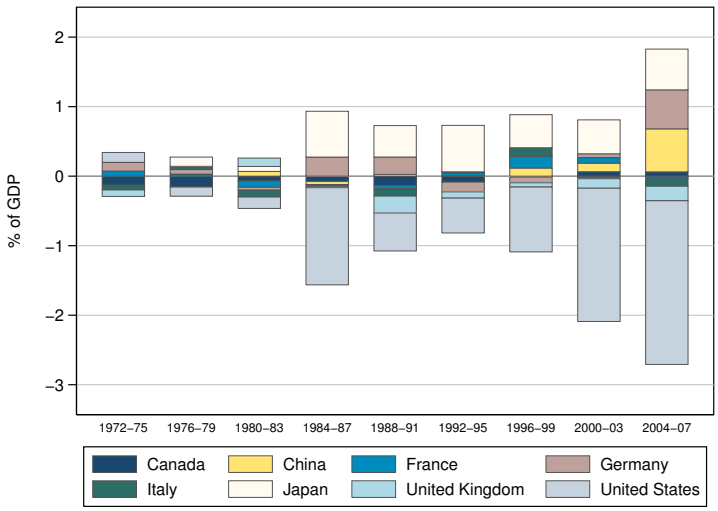
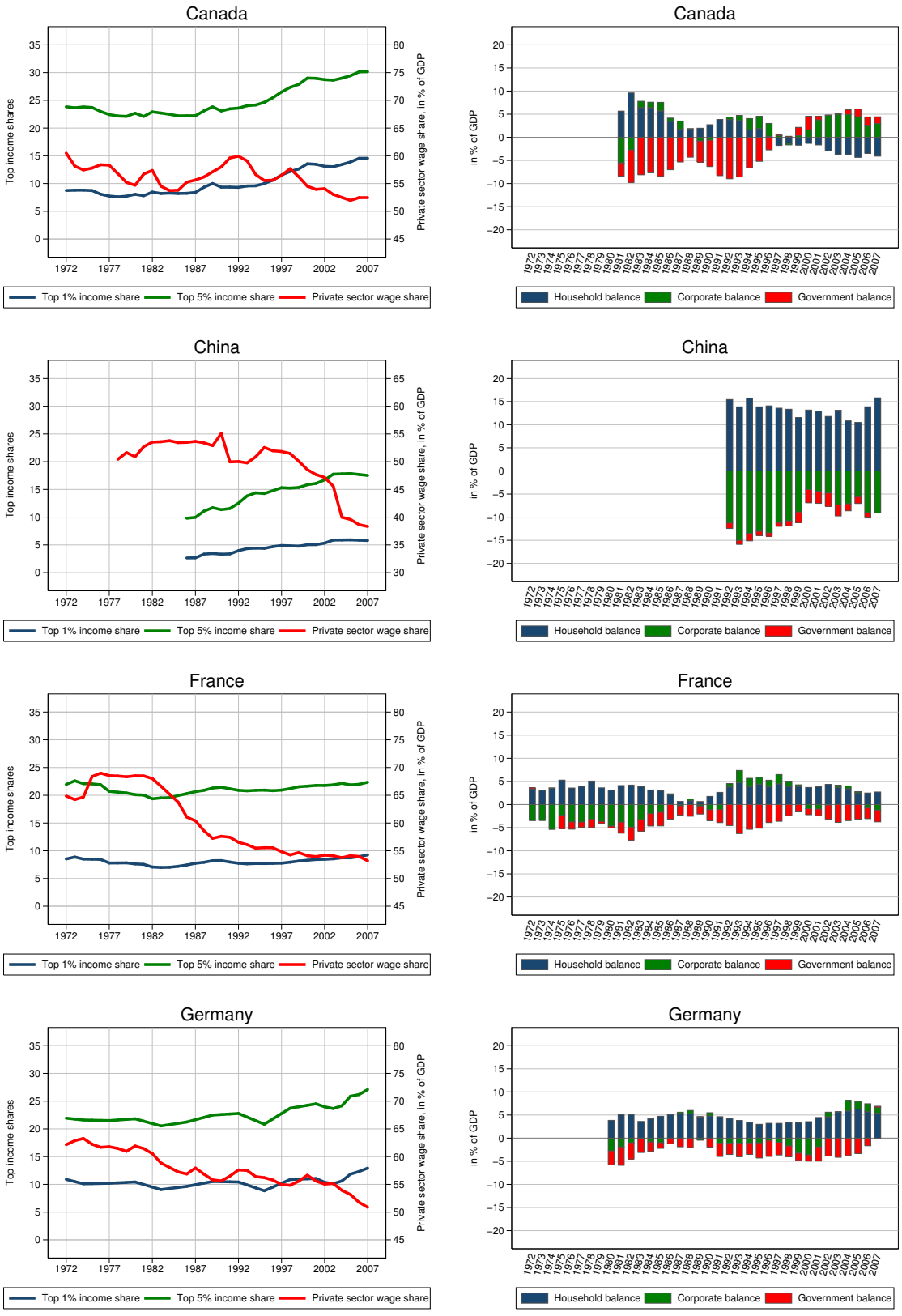


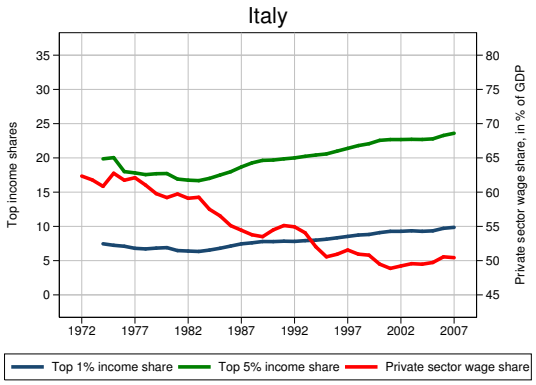
Figure 2.2 shows the development of the current account balances in these eight countries for the period 1972-2007. The U.S., the U.K., China, Germany, and Japan were those countries with the largest current account balances worldwide just before the Great Recession.

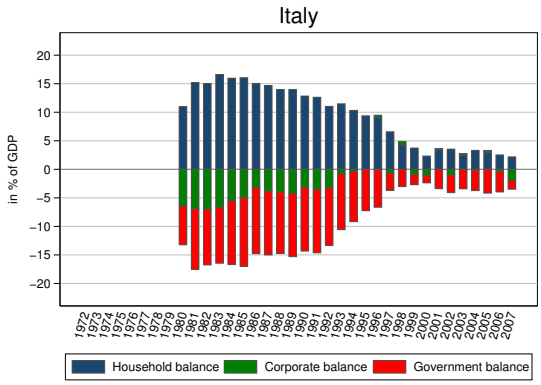
Figure 2.3 shows the evolution of top household income shares and the wage share (left column) and of sectoral financial balances (right column) for these countries. As is apparent from the Figure, household net lending declined in those countries where there was a rising trend in top income shares (U.S., U.K., Canada, Italy, Japan), but not in Germany and France, where top income shares remained relatively stable before the Great Recession. There also seems to be a negative relation between the private sector wage share and the financial balance of the corporate sector. This link is apparent in all countries, but especially in Canada, Japan, and Germany where the corporate sector has even turned to a net lending position for extended periods of time. In China, corporate net lending was highly negative in the early 1990s, but then increased strongly together with the current account balance until the mid-2000s. By contrast, in the U.S. and the U.K. the trends in the evolution of the wage share (downwards) and the corporate financial balance (upwards) have been far less pronounced.

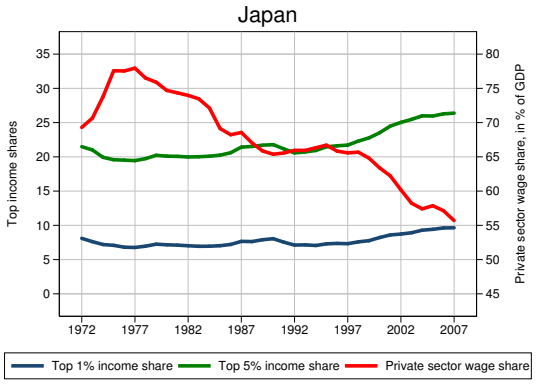
From Figure 2.4, it is apparent that a larger increase in top household income shares was linked to a tendency towards a decreasing current account, while a larger fall in the

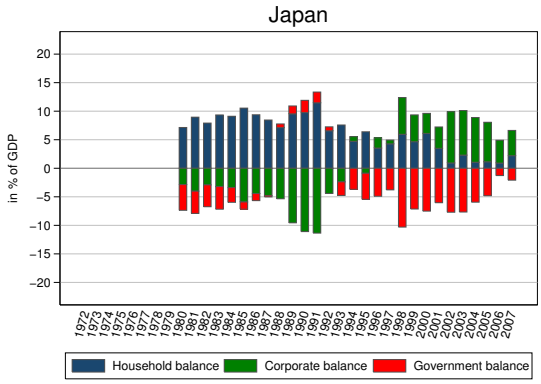
Figure 2.3: Income distribution and sectoral financial balances, G7 and China

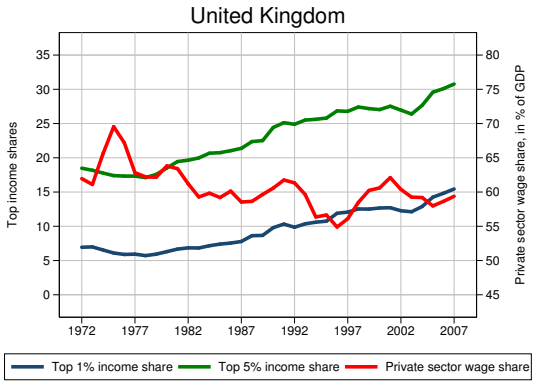


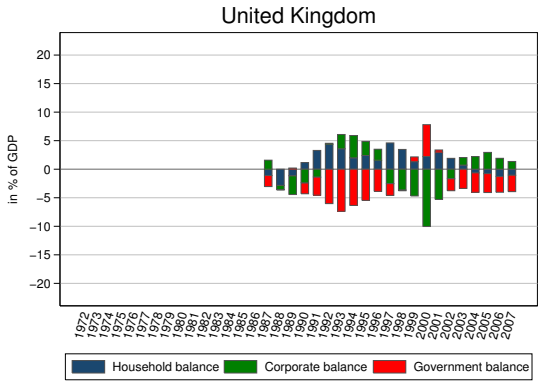

Italy
Top income shares
Private sector wage share, in % of GDP
Top 1% income share
Top 5% income share
Private sector wage share

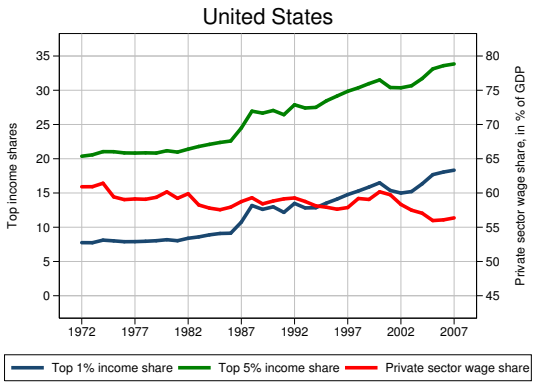

Italy
in % of GDP
Household balance
Corporate balance
Government balance


Japan
Top income shares
Private sector wage share, in % of GDP
Top 1% income share
Top 5% income share
Private sector wage share


Japan
in % of GDP
Household balance
Corporate balance
Government balance


United Kingdom
Top income shares
Private sector wage share, in % of GDP
Top 1% income share
Top 5% income share
Private sector wage share


United Kingdom
in % of GDP
Household balance
Corporate balance
Government balance


United States
Top income shares
Private sector wage share, in % of GDP
Top 1% income share
Top 5% income share
Private sector wage share

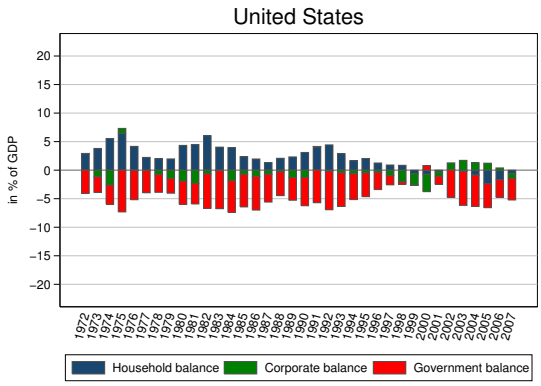
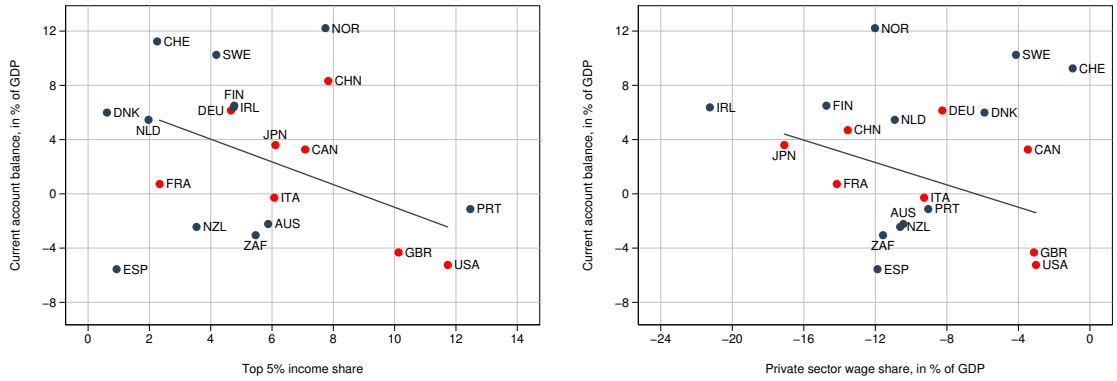

United States
in % of GDP
Household balance
Corporate balance
Government balance

Figure 2.4: Income distribution and current account balances



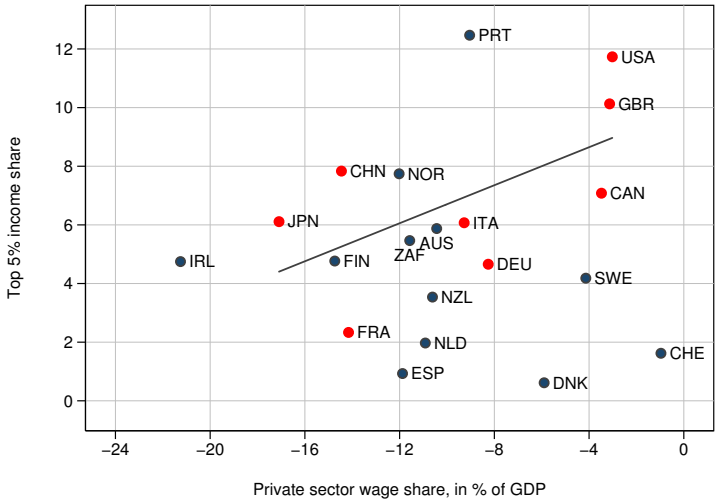
Notes: The figure shows the change in, respectively, the top 5% household income share and the private sector wage share (horizontal axis) against the change in the current account balance in % of GDP (vertical axis), 1980/3-2004/7 (four-year averages). For China changes are shown for the period 1984/7-2004/7. For all other countries, changes are calculated for the period 1980/3-2004/7 or for the longest available time span within this period.

wage share was associated with a tendency towards an increase in the current account.

An important issue to consider before turning to the empirical analysis is the relationship between the personal and the functional distribution of income. In particular, one might ask whether an increase of personal income inequality is systematically linked to a decrease of the wage share and whether these two variables may be seen as interchangeable or complementary in the current account estimations and how the estimation results may be affected by the potential collinearity between these variables. Figure 2.5 plots the change in the private sector wage share against the change in the top 5% income share, using four-year non-overlapping averages for 1980/3-2004/7. There was no systematic relationship between changes in top household income shares and changes in the wage share. However, in the most important current account deficit countries where top income shares have increased relatively strongly (U.S., U.K.), the wage share declined less. By contrast, in the most important current account surplus countries (Germany, Japan, China), the wage share has fallen more substantially, while the surge in top household income shares has been relatively minor.

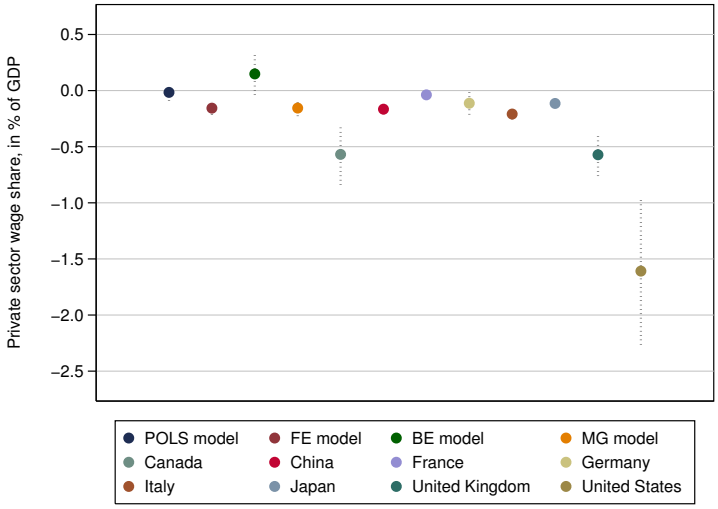
Figure 2.6 shows coefficient estimates from regressions of top household income shares on the wage share. While the within and the between correlation between these two variables is relatively small in our sample, the time series correlation for individual countries differs considerably across the G7 economies and China. In the Anglo Saxon, or "U-shape" countries, small decreases in the wage shares have been accompanied by large increases in top income shares, see Figure 2.5. By contrast, in such "L-shape" countries as France, Germany, and Japan, there has been almost no correlation between the (strongly decreasing) wage shares and the (relatively constant) top household income shares.

Figure 2.5: Top income shares and private sector wage shares



Notes: The figure shows the change in the private sector wage share (horizontal axis) against the change in the top 5% household income share (vertical axis), 1980/3-2004/7 (four-year averages). For China changes are shown for the period 1984/7-2004/7. For all other countries, changes are calculated for the period 1980/3-2004/7 or for the longest available time span within this period.

Figure 2.6: Top income shares and private sector wage shares: regression coefficients



Notes: The figure shows coefficients and 95% confidence intervals of regressions of the top 1% household income share on the private sector wage share for the period 1972-2007. "POLS model" indicates that the regression is estimated by pooled ordinary least squares with robust standard errors, "FE model" denotes a fixed effects estimator with robust standard errors, "BE model" denotes a between effects estimator and "MG model" refers to the mean-group estimator developed by Pesaran and Smith (1995). The other coefficient estimates refer to country-specific regressions.

An economic explanation for these findings is that the explosion of top management salaries and bonuses in the Anglo Saxon countries has contributed both to the rising dispersion of household incomes, and to the stabilization of the wage share. By contrast, the rising net financial savings accumulated by corporations in such countries as Germany or Japan may be seen as a consequence of the rise in profits at the expense of wages while at the same time limiting the rise in personal income inequality because corporate income is not accounted for in measures of personal income inequality. The highly heterogeneous relationship between personal income inequality on the one hand and the wage share on the other hand, points to the necessity of considering both the personal and functional income distribution as potential determinants of current account balances in the empirical analysis. This will allow us to analyze whether different patterns of income distribution are systematically related to current account surpluses or deficits.

Our empirical analysis focuses exclusively on the pre-crisis period. Clearly, the global financial crisis has substantially altered the saving and spending behavior of households, corporations and governments. For instance, the private household sector in many countries has engaged in a lengthy process of deleveraging since the outbreak of the crisis, precisely because the preceding period of dissaving had been accompanied by a strong rise in debt-to-income ratios especially among the lower income groups (Kumhof et al., 2015). Similar arguments can be made for the corporate and government sectors whose financing positions have also changed drastically during the crisis years, with complex implications for national current account balances as well as income distribution.

2.4 Empirical analysis

2.4.1 Estimation strategy

Our econometric specifications build on the panel estimation literature on current account determinants, which includes amongst others Chinn and Prasad (2003), Lee et al. (2008), Gruber and Kamin (2007), Chinn and Ito (2007), Phillips et al. (2013), and Chinn et al. (2014).

Our estimation strategy starts with regressing the current account on a set of standard explanatory variables plus different measures of functional income distribution (FID) and personal income distribution (PID):

$$CA_{i,t} = \beta_0 + X_{i,t}\Gamma + \beta_1 FID_{i,t} + \beta_2 PID_{i,t} + \varepsilon_{i,t} \tag{2.2}$$

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$ denote the cross-sectional and time dimensions, respectively. The dependent variable $CA_{i,t}$ is the current account balance in percent of GDP and $X_{i,t}$ is a set of standard explanatory variables that are typically used in the literature

on current account determinants. $FID_{i,t}$ refers to different measures of the wage share, and $PID_{i,t}$ refers to different measures of personal income inequality. $\varepsilon_{i,t}$ is a residual error term with zero mean.

We can inquire further into the functional chains linking income distribution and the current account by estimating Equation 2.2 with the same explanatory variables for the household, corporate, and government financial balances, which by definition, sum up to the current account balance. We can thus test whether a change in factor shares or personal income inequality affects primarily the household sector, the corporate sector, or the government sector.

We work with an unbalanced panel that includes 20 countries for which series for top income shares and wage shares were available for the period 1972-2007. The sample consists largely of advanced economies but also a few emerging economies. The following countries are included in the sample: Australia, Canada, China, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, the U.K., and the U.S. Variable definitions and data sources are provided in Appendix 2.A.

Most of the explanatory variables in the current account specifications are converted into deviations from a GDP-weighted sample mean.[3] That is, each country's variables are measured relative to a weighted average of other countries' values prevailing at the same time (see Appendix 2.B for details). The cross-sectional demeaning accounts for the fact that a given economy's current account is by nature measured relative to other countries, so that it must be determined by both its own and its trading partners' characteristics.[4]

To uncover medium-term developments in current accounts, we filter the data by constructing non-overlapping four-year averages of annual observations, following Lee et al. (2008). This approach has the advantage of abstracting somewhat from current account dynamics driven by the business cycle and reducing the possibility of significant measurement error in annual data. We estimate Equation 2.2 using simple pooled ordinary least squares (OLS) applied to four-year averaged data with standard errors robust to heteroskedasticity and arbitrary forms of serial correlation.[5]

One concern in our current account specifications may be the problem of endogeneity due to potential reverse causality which yields biased and inconsistent coefficient estimates. In particular, the fiscal balance, which is used as explanatory variable in Equation 2.2, is likely to be influenced by current account developments. In order to address the issue of endogeneity more comprehensively, Equation 2.2 is estimated with two-stage

[3]This treatment does not apply to a few variables because it is already implicit in their definition (net foreign assets, terms of trade, own currency's share in world reserves).

[4]The estimation results are generally robust to using average foreign trade flows for the cross-sectional demeaning.

[5]The estimation results are generally robust to using non-overlapping five-year averages as applied by Chinn and Prasad (2003), Chinn and Ito (2007), Gruber and Kamin (2007), Chinn et al. (2014).

least squares (2SLS).[6] We implement a finite-sample correction of the covariance matrix estimate and correct standard errors for heteroskedasticity and arbitrary forms of serial correlation.

Another potential concern is an estimation bias that could arise if relevant explanatory variables explaining cross-sectional variation in the data are not included in the current account specifications, but are correlated with other variables. In static panel data models with unobserved heterogeneity, the fixed effects (FE) estimator provides consistent estimates when the explanatory variables are strictly exogenous. Thus, estimation results are presented for the fixed effects models. However, as noted by Chinn and Prasad (2003), including fixed effects removes much of the cross-country variation which is problematic in the context of current account estimations since much of the variation in the data stems in fact from the cross-sectional dimension.[7] Phillips et al. (2013) emphasize that country-specific effects may reflect the uncaptured effects of sustained distortions on current account balances.

We also test the robustness of the results using annual data. This approach helps uncover cyclical sources of current account fluctuations and allows for the inclusion of a larger number of explanatory variables due to more degrees of freedom. For the estimations with annual observations we use pooled GLS with a panel-wide AR(1) correction to deal with autocorrelation, following Phillips et al. (2013). To mitigate endogeneity issues, we also perform estimations where the fiscal balance is instrumented.[8] As a further robustness check, we add country-specific effects to the models in order to capture unobserved heterogeneity.

2.4.2 Results

Do the functional and the personal income distribution affect the current account?

Table 2.1 presents the results for different variants of Equation 2.2, based on pooled OLS estimation with four-year non-overlapping averages. Column 1 shows the results for a baseline model without distribution variables. The set of explanatory variables is similar to that applied in Lee et al. (2008), but we exclude the banking crisis, Asian crisis and financial center dummies used in that study since our sample consists largely of in-

[6] In estimations applied to four-year averaged data, the fiscal balance is instrumented with the world fiscal balance, world GDP growth, world output gap, U.S. corporate credit spread, the polity index, the exchange rate regime, unemployment rate, and the time average of the fiscal balance. The first stage regressions also control for the independent current account regressors.

[7] The variance decomposition for the data set indicates that about 45 percent in the sample variation of the current account balance is attributable to cross-sectional variation.

[8] In estimations applied to annual observations, the fiscal balance is instrumented with the lagged world fiscal balance, lagged world GDP growth, lagged world output gap, lagged output gap, lagged U.S. corporate credit spread, the polity index, the exchange rate regime, lagged unemployment rate, and the time average of the fiscal balance. The first stage regressions also control for the independent current account regressors.

Table 2.1: Current account regression model (four-year averages)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Regressors	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA
Net foreign assets (% of GDP)	0.070***	0.075***	0.074***	0.075***	0.076***	0.082***	0.063***	0.085***	0.083***	0.089***
	(0.010)	(0.010)	(0.010)	(0.008)	(0.009)	(0.010)	(0.015)	(0.010)	(0.010)	(0.008)
Output per worker (rel. to top 3 economies)	0.008	0.018	0.011	-0.005	0.002	0.002	0.034*	0.012	0.006	-0.014
	(0.015)	(0.014)	(0.013)	(0.013)	(0.015)	(0.013)	(0.019)	(0.011)	(0.010)	(0.009)
Output growth	-0.170	-0.281**	-0.367**	-0.169	-0.390***	-0.411***	-0.528***	-0.484***	-0.523***	-0.441***
	(0.115)	(0.109)	(0.129)	(0.157)	(0.114)	(0.102)	(0.125)	(0.103)	(0.122)	(0.152)
Dependency ratio	-0.236*	-0.309***	-0.337***	-0.369***	-0.263**	-0.290***	-0.146	-0.350***	-0.362***	-0.448***
	(0.123)	(0.101)	(0.095)	(0.102)	(0.105)	(0.091)	(0.109)	(0.079)	(0.079)	(0.075)
Population growth	-2.492***	-2.128***	-2.189***	-2.036**	-2.639***	-2.585***	-3.077***	-2.248***	-2.314***	-2.082***
	(0.771)	(0.726)	(0.698)	(0.801)	(0.667)	(0.640)	(0.611)	(0.540)	(0.582)	(0.589)
Terms of trade gap × Trade openness	0.614	0.615	0.570	0.730	0.390	0.345	0.651	0.374	0.366	0.440
	(0.496)	(0.509)	(0.484)	(0.494)	(0.490)	(0.492)	(0.452)	(0.500)	(0.475)	(0.457)
Private credit (% of GDP)	-0.076***	-0.071**	-0.073***	-0.074***	-0.071***	-0.067**	-0.071**	-0.064**	-0.066**	-0.064**
	(0.026)	(0.026)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Fiscal balance (% of GDP)	0.392***	0.306***	0.308***	0.282***	0.363***	0.341***	0.376***	0.269***	0.283***	0.210***
	(0.083)	(0.078)	(0.070)	(0.098)	(0.072)	(0.063)	(0.099)	(0.051)	(0.048)	(0.056)
Top 1% income share	-	-0.442***	-	-	-	-	-	-0.397**	-	-
		(0.147)						(0.140)		
Top 5% income share	-	-	-0.291***	-	-	-	-	-	-0.242**	-
			(0.095)						(0.089)	
Gini coefficient	-	-	-	-0.210***	-	-	-	-	-	-0.237***
				(0.064)						(0.056)
Total economy wage share	-	-	-	-	-0.181**	-	-	-	-	-
					(0.071)					
Private sector wage share	-	-	-	-	-	-0.201***	-	-0.180***	-0.158**	-0.228***
						(0.057)		(0.057)	(0.059)	(0.053)
Manufacturing sector wage share	-	-	-	-	-	-	-0.170***	-	-	-
							(0.039)			
Observations	128	128	128	128	128	128	113	128	128	128
Countries	20	20	20	20	20	20	20	20	20	20
Adj. R-squared	0.588	0.636	0.644	0.636	0.608	0.634	0.594	0.672	0.670	0.697
Root mean squared error	0.027	0.026	0.025	0.026	0.027	0.026	0.026	0.024	0.024	0.023

Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled OLS. Standard errors in parantheses are corrected for heteroskedasticity and autocorrelation of the error term. All estimations include a constant term. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 2.A for a detailed description of the data.

dustrialized countries. Estimated coefficients are mostly statistically significant and have expected signs and plausible magnitudes in line with previous studies (see Lee et al., 2008; Ca' Zorzi et al., 2012).

The coefficient on the fiscal balance implies that a 1 percentage point increase in the government budget balance (relative to trading partners) leads to a 0.39 percentage point increase in the current account balance in percent of GDP. This result is broadly consistent with previous estimates, which mostly ranged between 0.2 and 0.5. A higher dependency ratio, higher population growth and higher real GDP growth reduce the current account balance. Relative output per worker has no significant effect on the current account balance, as can be expected for a sample consisting mostly of developed economies where catching-up effects are small (Chinn et al., 2014). The 0.07 coefficient on initial NFA implies that an increase in NFA of 10 percent of GDP raises the medium-term current account balance by about 0.7 percent of GDP. The sign of the coefficient is theoretically ambiguous, but the positive sign estimated here is consistent with previous findings (Chinn and Prasad, 2003; Lee et al., 2008). The size of the coefficient is relatively large compared with that reported by Lee et al. (2008) for a sample of industrialized and emerging economies, but in line with the results by Chinn et al. (2014) for an industrialized countries sample. An improvement in the terms of trade, conditional on the degree of trade openness, raises the current account balance. An increase in the private credit-to-GDP ratio reduces the current account. This result may be interpreted as reflecting the effect of financial market depth or of financial liberalization (Kumhof et al., 2012).

Columns 2-4 present the results for three models where different measures of personal income inequality were added to the baseline specification. Both the top 1% and 5% income shares and the Gini coefficient of equivalized household disposable income are found to be statistically significant, and in each case the fit of the model improves relative to the benchmark model in Column 1. A 1 percentage point increase of the top 1% household income share (relative to trading partners), for example, reduces the current account balance by 0.44 percentage points (Column 2). This result confirms the analysis by Kumhof et al. (2012) and is also consistent with the trickle-down consumption and expenditure cascades hypotheses, but contradicts the simple Keynesian consumption function and different variants of models with bequests or precautionary savings.

In the models presented in Columns 5-7, different measures of the wage share were added to the baseline specification (excluding measures of personal income distribution). The total economy wage share, the private sector wage share and the manufacturing sector wage share are all significantly and negatively related to the current account balances. Again, the fit of the model improves upon inclusion of the distribution variables, compared with the baseline model. A 1 percentage point increase of the private sector wage share (relative to trading partners), for example, reduces the current account balance by 0.20 percentage points (Column 6). Interestingly, a rise in the wage share has the op-

Table 2.2: Current account regression model (four-year averages): robustness

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	CA	CA	CA	CA	CA	CA
Net foreign assets (% of GDP)	0.085***	0.083***	0.089***	0.052	0.053*	0.053*
	(0.009)	(0.009)	(0.008)	(0.030)	(0.029)	(0.028)
Output per worker (rel. to top 3 economies)	0.008	0.002	-0.015	-0.024	-0.022	-0.012
	(0.012)	(0.011)	(0.009)	(0.041)	(0.041)	(0.035)
Output growth	-0.510***	-0.552***	-0.455***	-0.412**	-0.396**	-0.356
	(0.091)	(0.112)	(0.148)	(0.185)	(0.187)	(0.214)
Dependency ratio	-0.347***	-0.358***	-0.443***	-0.380**	-0.349*	-0.350**
	(0.082)	(0.081)	(0.080)	(0.178)	(0.168)	(0.154)
Population growth	-2.258***	-2.318***	-2.093***	-1.084	-1.382	-1.670
	(0.537)	(0.573)	(0.584)	(0.961)	(0.971)	(1.220)
Terms of trade gap $\times$ Trade openness	0.298	0.274	0.401	0.508	0.520	0.578
	(0.525)	(0.501)	(0.452)	(0.355)	(0.315)	(0.378)
Private credit (% of GDP)	-0.065**	-0.068**	-0.064**	-0.060**	-0.061**	-0.058**
	(0.024)	(0.024)	(0.025)	(0.026)	(0.025)	(0.026)
Fiscal balance (% of GDP)	0.329***	0.354***	0.241***	0.361***	0.356***	0.292***
	(0.085)	(0.077)	(0.078)	(0.104)	(0.101)	(0.088)
Private sector wage share	-0.174***	-0.152**	-0.224***	-0.376*	-0.353*	-0.381*
	(0.058)	(0.060)	(0.056)	(0.206)	(0.193)	(0.196)
Top 1% income share	-0.374**	-	-	-0.402	-	-
	(0.150)			(0.288)		
Top 5% income share	-	-0.228**	-	-	-0.389*	-
		(0.092)			(0.199)	
Gini coefficient	-	-	-0.230***	-	-	-0.232
			(0.060)			(0.171)
Observations	128	128	128	128	128	128
Countries	20	20	20	20	20	20
Adj. R-squared	0.670	0.667	0.696	0.514	0.528	0.516
Root mean squared error	0.024	0.025	0.023	0.020	0.020	0.020

Notes: CA is the current account balance in % of GDP. The models (1)-(3) are estimated by two-stage least squares (2SLS) and the models (4)-(6) are estimated by OLS and include country fixed effects. Standard errors in parentheses are corrected for heteroskedasticity and autocorrelation of the error term. All estimations include a constant term. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 2.A for a detailed description of the data.

posite effect of a fall in personal income inequality (in line with the underconsumption hypothesis).

In Columns 8-10, we present models in which both the private sector wage share and the different personal income inequality measures are included in the estimation. While the estimated marginal effects of the various distribution variables as well as of the control variables remain stable overall, the fit of the model increases considerably, with the R-squared rising from 0.59 in the baseline model (Column 1) to 0.67-0.70 in the models including measures of both the functional and the personal income distribution.

Likelihood ratio tests (not reported) show that the differences in model fit are statistically significant, that is, the less restrictive models (the ones including measures of either functional or personal income inequality, or both) fit the data significantly better than the baseline model. Standard diagnostic tests also indicate the absence of multicollinearity problems in our estimations. We conclude that taking account of functional and personal income distribution significantly improves our understanding of the current account.

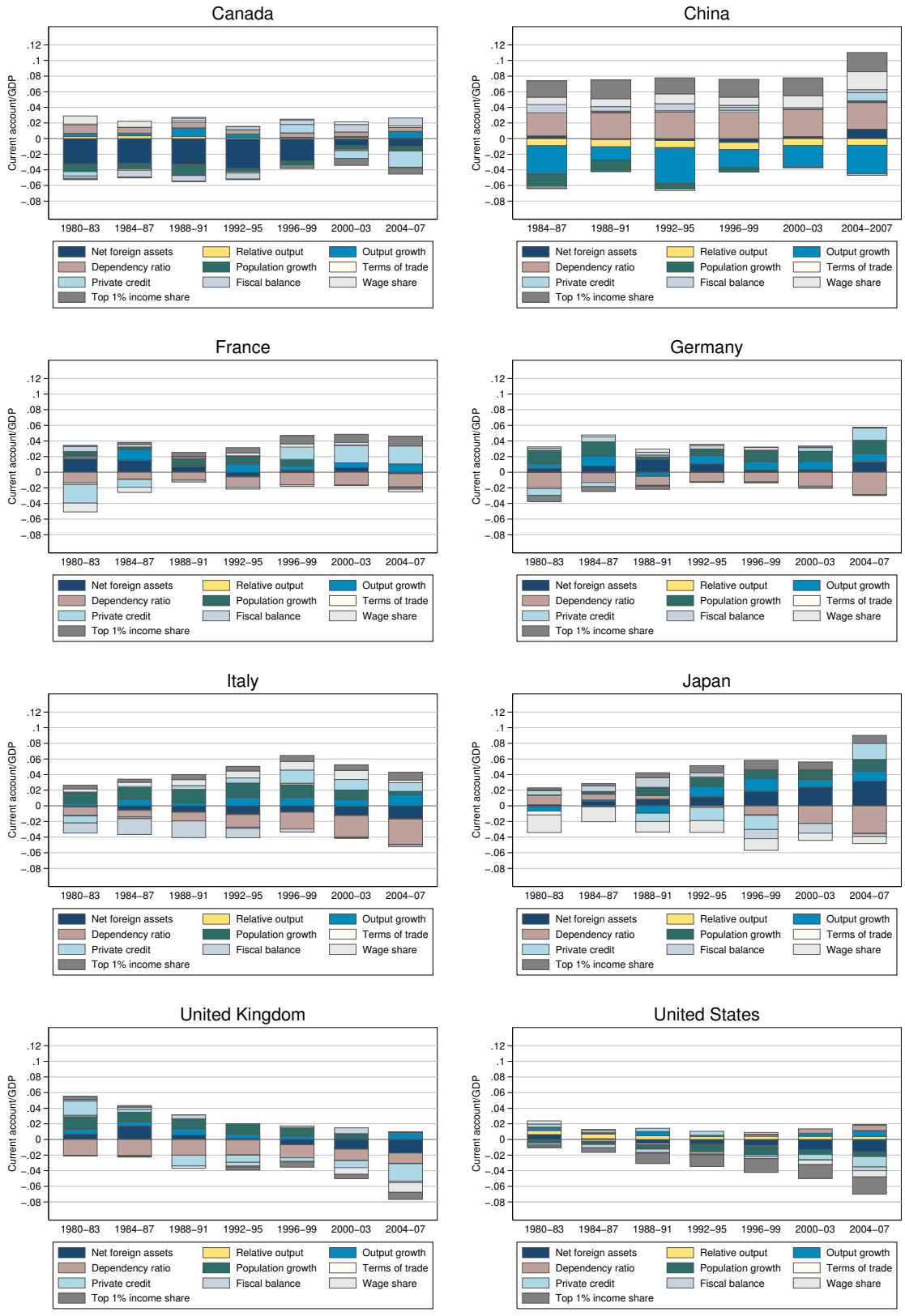
Alternative specifications of the current account regressions

The estimations reported in Table 2.2 perform two sets of robustness checks. Firstly, in Columns 1-3, results of two-stage least squares (2SLS) estimations are shown with instrumented fiscal balances. The results are largely robust to the instrumental variable approach throughout the different models.

Columns 4-6 report estimation results with country fixed effects. In the literature, there is no consensus as to whether fixed effects should be added to estimations of current account determinants. Our pooled estimations include no country-specific constants and therefore use the variables in the regression to explain both the between- and within-country variation in the data. Including country fixed effects has the advantage of controlling for unobserved, time-invariant characteristics such as country-specific saving norms. All our main conclusions that were made on the basis of the pooled models remain qualitatively unchanged. Compared with the results of the pooled estimation, the fixed effect estimates have the same signs, but somewhat different magnitudes. Interestingly, the estimated effects of the wage share, and top household income shares are larger in absolute terms (though at somewhat lesser significance levels) in the fixed effects models than in the pooled models. In the current account estimation reported in Column 5, the estimated coefficient of the private wage share is -0.35, and that of the top 5% income share is -0.39, against the estimates from the pooled model of, respectively, -0.16 and -0.24 (Table 2.1, Column 9).

One explanation for the larger effect of the functional distribution in the fixed effects estimations is that the time-average of the private sector wage share differs considerably across countries, reflecting long-term differences in the industrial structure across coun-

Figure 2.7: Contribution analysis for national current accounts, G7 and China



tries. To take an example, the private sector wage share was higher in Japan than in the U.S. throughout the entire sample period, but while it remained relatively stable over time in the U.S., it decreased by more than 20 percentage points in Japan from the late 1970s to the mid-2000s (Figure 2.3). The fixed effects estimations are thus better suited than the pooled models to reflect the negative time-series correlation between the wage share and the current account. Similarly, top household income shares increased strongly in such countries as Italy or the U.K., but starting from low levels compared to other countries (Figure 2.3). For example, the time average of top household income shares is relatively high in Germany, due to a large number of unincorporated businesses. Here, the fixed effects models may be better suited than the pooled models to account for the negative time-series correlation between the top income shares and the current account.

The contribution of income distribution to the current account imbalances

Figure 2.7 shows the estimated contributions of all explanatory variables to the current account balances of Canada, China, France, Germany, Italy, Japan, the U.K., and the U.S., based on the model estimates reported in Column 8 of Table 2.1. This model includes the private sector wage share and the top 1% income share. The model accounts for large parts of the pre-crisis current account balances of the main deficit and surplus countries, *i.e.*, the U.S. (estimated current account of -5.5 percent of GDP, against an actual current account balance of -5.6 percent of GDP in 2004/7), the U.K. (-7.0 against -2.6), Germany (2.4 against 5.9), Japan (3.9 against 4.0), and China (6.0 against 7.0). As can be seen in the Figure, the contributions of the wage share and top income shares to the current account balances are considerable for a number of countries.

The importance of top income shares for the current account is most clearly visible for the U.S. The estimated effects of the wage share are strongest in the large surplus countries China and Japan. Taken together, changes in the wage share and the top income share account for an estimated -3.6 percentage points change of the current account balance for the U.S. over the sample period (1972/5-2004/7). For the U.K., China (1984/7-2004/7), Germany, and Japan, the respective numbers are -2.5, +1.7, +0.8, and +1.6.

The observation that functional and personal income distribution are important determinants of current account balances is confirmed by the estimation of beta coefficients for the estimation originally shown in Table 2.1. The beta coefficients show how many standard deviations the current account balance will change, per standard deviation increase in the different explanatory variable. Compared with the other explanatory variables, the functional and the personal income distribution variables are found to have a strong influence on the variation of current account balances.[9]

[9]The beta coefficients for the model underlying Column 8 in Table 2.1 are as follows: Net foreign assets: 0.70, relative income: 0.08, output growth: -0.22, dependency ratio: -0.39, population growth: -0.27, terms of trade: 0.04, private credit: -0.28, fiscal balance: 0.23, wage share: -0.24, top 1% income share: -0.23.

Table 2.3: Current account regression model (annual data)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regressor	CA	CA	CA	CA	CA	CA	CA	CA	CA
L.Net foreign assets (% of GDP)	0.075***	0.073***	0.076***	0.073***	0.072***	0.073***	0.053***	0.053***	0.056***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)	(0.009)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.107***	-0.104***	-0.105***	-0.096***	-0.093***	-0.095***	-0.092***	-0.092***	-0.093***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	(0.017)	(0.017)	(0.018)
L.Output per worker (rel. to top 3 economies)	-0.025	-0.026	-0.052**	-0.036	-0.038*	-0.058***	-0.053*	-0.049	-0.048
	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)	(0.021)	(0.032)	(0.032)	(0.031)
L.Relative output per worker × Capital openness	0.064**	0.059*	0.080***	0.065**	0.061*	0.079***	0.058	0.053	0.054
	(0.031)	(0.032)	(0.029)	(0.031)	(0.032)	(0.030)	(0.036)	(0.036)	(0.034)
Output growth	-0.316**	-0.326**	-0.274*	-0.421***	-0.431***	-0.351**	-0.189	-0.174	-0.150
	(0.146)	(0.148)	(0.142)	(0.152)	(0.153)	(0.150)	(0.148)	(0.148)	(0.149)
Dependency ratio	-0.119*	-0.126*	-0.197***	-0.120*	-0.126*	-0.177**	-0.341***	-0.310***	-0.310***
	(0.070)	(0.072)	(0.069)	(0.070)	(0.071)	(0.069)	(0.087)	(0.085)	(0.082)
Population growth	-1.222***	-1.242***	-1.290***	-1.271***	-1.294***	-1.306***	-0.262	-0.302	-0.377
	(0.377)	(0.381)	(0.374)	(0.378)	(0.381)	(0.376)	(0.384)	(0.385)	(0.400)
Reserve currency status	-0.018	-0.018	-0.024**	-0.010	-0.010	-0.018	0.027	0.024	0.029
	(0.012)	(0.012)	(0.010)	(0.012)	(0.012)	(0.011)	(0.022)	(0.022)	(0.023)
Output gap	-0.425***	-0.419***	-0.441***	-0.530***	-0.526***	-0.519***	-0.486***	-0.487***	-0.496***
	(0.076)	(0.076)	(0.079)	(0.084)	(0.085)	(0.086)	(0.071)	(0.071)	(0.075)
Terms of trade gap × Trade openness	0.421***	0.415***	0.404***	0.323***	0.315***	0.330***	0.374***	0.368***	0.362***
	(0.065)	(0.065)	(0.065)	(0.076)	(0.076)	(0.076)	(0.060)	(0.060)	(0.061)
Private credit (% of GDP)	-0.041***	-0.042***	-0.044***	-0.042***	-0.043***	-0.044***	-0.036***	-0.037***	-0.037***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Fiscal balance (% of GDP)	0.094**	0.093**	0.075*	0.286***	0.291***	0.223**	0.138***	0.138***	0.123***
	(0.045)	(0.045)	(0.045)	(0.094)	(0.096)	(0.100)	(0.045)	(0.045)	(0.045)
Private sector wage share	-0.210***	-0.201***	-0.206***	-0.196***	-0.187***	-0.196***	-0.391***	-0.390***	-0.391***
	(0.040)	(0.041)	(0.038)	(0.040)	(0.040)	(0.038)	(0.050)	(0.050)	(0.049)
L.Top 1% income share	-0.316***	-	-	-0.294***	-	-	-0.289***	-	-
	(0.087)			(0.087)			(0.095)		
L.Top 5% income share	-	-0.198***	-	-	-0.181***	-	-	-0.230***	-
		(0.058)			(0.058)			(0.072)	
L.Gini coefficient	-	-	-0.190***	-	-	-0.161***	-	-	-0.106*
			(0.040)			(0.044)			(0.063)
Observations	479	479	479	479	479	479	479	479	479
Countries	20	20	20	20	20	20	20	20	20
R-squared	0.667	0.658	0.709	0.682	0.677	0.711	0.789	0.791	0.795
Root mean squared error	0.027	0.027	0.025	0.026	0.026	0.025	0.025	0.025	0.025

Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parantheses. In models (4)-(6), the fiscal balance is instrumented. In models (1)-(3) and (7)-(9), the fiscal balance is lagged by one year. The models (7)-(9) include country fixed effects. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 2.A for a detailed description of the data.

A larger model with annual data for the current account and sectoral financial balances

We also estimate a larger model based on annual observations. Phillips et al. (2013) recommend using pooled GLS with a panel-wide AR(1) correction. Even though they acknowledge that current account data display strong autocorrelation, they do not address the issue of non-stationarity. Similarly, Lee et al. (2008) argue that cointegration methods are not appropriate because the current account balance (in percent of GDP) is a stationary series in most countries during most sample periods. Moreover, under certain conditions the current account needs to be stationary for the intertemporal budget constraint to hold (Taylor, 2002). In our sample, which ends in 2007 and hence, in contrast to Phillips et al. (2013), does not include post-crisis re-balancing, augmented Dickey-Fuller tests indicate that unit roots may be present in the current account balances of a number of countries, even though the results are highly sensitive to the sample period. We do not pursue the issue of non-stationarity further, but suggest that the estimation results based on annual data be treated with caution.

Table 2.3 shows the results for the estimations based on annual data.[10] The estimations in Columns 1-3 are based on pooled models. In the estimations reported in Columns 4-6, the government balance was instrumented, and Columns 7-9 show the results of models estimated with fixed effects. Compared with the previous estimations, additional regressors include the output gap, an interaction term between relative output per worker and capital account openness, and an interaction term allowing for a non-linear relationship between the initial net foreign asset position[11] and the current account, and reserve currency status. We use lagged variables in those cases where simultaneity bias may be expected. For output growth, we construct a trend variable to abstract from merely cyclical variations.

The estimations based on annual data yield overall very similar results to the estimations based on multi-year averages. The effects of the income distribution variables are largely robust to instrumentation as well as to fixed effects estimation.

We also estimate the model for the financial balances of the household, corporate, and government sectors separately. By definition, the current account balance is the sum of the financial balances of the household sector, the corporate sector, and the government sector. Hence, estimations for the sectoral balances may yield further insights into the ways in which the distribution of income affects the financing positions of the different sectors in the economy. However, a few words of caution are in order. Firstly, note that the estimated coefficients are not directly comparable to those for Equation 2.2. One rea-

[10] The choice of variables largely follows Phillips et al. (2013), but we leave out a number of variables that are relevant primarily for developing countries or that turned out to be insignificant.

[11] Catão and Milesi-Ferretti (2014) suggest that crisis probabilities increase when the net foreign debt is above 60 per cent of GDP.

Table 2.4: Sectoral financial balances regression model (annual data)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regressor	FB^{HH}	FB^{HH}	FB^{HH}	FB^{CORP}	FB^{CORP}	FB^{CORP}	FB^{GOV}	FB^{GOV}	FB^{GOV}
L.Net foreign assets (% of GDP)	0.031***	0.031***	0.026***	0.031***	0.029***	0.032***	0.006	0.006	0.009
	(0.007)	(0.007)	(0.007)	(0.010)	(0.010)	(0.009)	(0.006)	(0.006)	(0.007)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.031	-0.032*	-0.024	-0.007	-0.003	-0.006	-0.050**	-0.051**	-0.054***
	(0.019)	(0.019)	(0.018)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.021)
L.Output per worker (rel. to top 3 economies)	-0.154***	-0.152***	-0.155***	0.085***	0.082***	0.074***	0.061***	0.061***	0.056***
	(0.023)	(0.023)	(0.025)	(0.026)	(0.026)	(0.027)	(0.020)	(0.019)	(0.020)
L.Relative output per worker × Capital openness	0.144***	0.134***	0.152***	-0.116***	-0.110***	-0.112***	0.011	0.012	0.007
	(0.031)	(0.031)	(0.031)	(0.036)	(0.036)	(0.035)	(0.029)	(0.029)	(0.028)
Output growth	-0.343**	-0.366**	-0.310**	-0.543***	-0.525***	-0.548***	0.818***	0.823***	0.787***
	(0.148)	(0.147)	(0.150)	(0.171)	(0.171)	(0.170)	(0.149)	(0.149)	(0.150)
Dependency ratio	0.014	-0.006	0.051	-0.082	-0.068	-0.115	0.104	0.107	0.065
	(0.071)	(0.071)	(0.076)	(0.086)	(0.086)	(0.090)	(0.070)	(0.071)	(0.076)
Population growth	-0.604	-0.565	-0.697*	-0.014	-0.064	0.029	0.100	0.100	0.211
	(0.389)	(0.385)	(0.398)	(0.440)	(0.438)	(0.441)	(0.371)	(0.371)	(0.375)
Reserve currency status	0.014	0.020*	0.001	0.014	0.007	0.017	-0.058***	-0.058***	-0.046***
	(0.011)	(0.012)	(0.011)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)	(0.013)
Output gap	-0.224***	-0.218***	-0.231***	-0.551***	-0.557***	-0.557***	0.525***	0.524***	0.526***
	(0.063)	(0.062)	(0.062)	(0.068)	(0.069)	(0.068)	(0.069)	(0.069)	(0.068)
Terms of trade gap × Trade openness	-0.015	-0.015	-0.019	0.021	0.019	0.017	0.367***	0.369***	0.367***
	(0.059)	(0.058)	(0.059)	(0.072)	(0.073)	(0.072)	(0.073)	(0.073)	(0.073)
Private credit (% of GDP)	-0.037***	-0.035***	-0.041***	-0.012	-0.014*	-0.012	0.031***	0.031***	0.033***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Private sector wage share	0.098***	0.100***	0.110***	-0.324***	-0.317***	-0.326***	-0.054	-0.057	-0.065
	(0.037)	(0.037)	(0.037)	(0.046)	(0.045)	(0.045)	(0.040)	(0.039)	(0.040)
L.Top 1% income share	-0.165**	-	-	-0.069	-	-	0.082	-	-
	(0.077)			(0.104)			(0.089)		
L.Top 5% income share	-	-0.163***	-	-	0.029	-	-	0.057	-
		(0.054)			(0.069)			(0.058)	
L.Gini coefficient	-	-	0.025	-	-	-0.075	-	-	-0.053
			(0.049)			(0.055)			(0.045)
Observations	479	479	479	479	479	479	479	479	479
Countries	20	20	20	20	20	20	20	20	20
R-squared	0.491	0.498	0.497	0.323	0.324	0.335	0.423	0.426	0.438
Root mean squared error	0.033	0.033	0.033	0.032	0.032	0.032	0.030	0.030	0.030

Notes: FB^{HH} is the household financial balance in % of GDP, FB^{CORP} is the corporate financial balance in % of GDP, FB^{GOV} is the government financial balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parantheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 2.A for a detailed description of the data.

son is that we did not include the government balance, which is routinely applied as an explanatory variable in current account estimations, in our estimations for the household and corporate sectors. Another reason is that, unlike national current account balances the sectoral balances need not sum to zero at the international level. Secondly, the separation of the current account into sectoral balances relies on a number of statistical conventions that may not always capture the economic realities consistently throughout the different countries. For instance, the importance of unincorporated businesses, which are treated as part of the household sector in the national account, varies across countries and over time. Similar issues concern government-owned enterprises. Finally, because the current account model from Equation 2.2 is based on an intertemporal optimization problem for the household sector, the same model, when applied to the corporate and government sectors, will likely be misspecified. In particular, rational households in their saving decisions should take into account the financial position of the government and corporate sectors (see the literature on Ricardian equivalence and the corporate veil).

Bearing these limitations in mind, we now discuss the estimation results for the sectoral balances using the larger model with annual data.[12] Columns 1-3 of Table 2.4 show estimation results for the household financial balance. Both top household income shares and the wage share are negatively related to the household financial balance, a result that is consistent with the relative income hypothesis and trickle-down consumption. According to the estimations shown in Column 2, for instance, a 1 percentage point increase in the top 5% household income share reduces the private household financial balance by 0.16 percentage points. By contrast, a 1 percentage point decrease in the wage share reduces the household balance by 0.10 percentage points.

Columns 4-6 report the estimation results for the corporate financial balance. While personal inequality appears to be unrelated to corporate net lending, the estimated effect of the wage share on corporate net lending is statistically significant and negative.[13] A 1 percentage point decrease in the private sector wage share raises the corporate financial balance by 0.32-0.33 percentage points. Taken as such, this implies that a rise in the profit share raises corporate savings more than corporate investment, which is in line with the underconsumption view. Moreover, the negative effect of the wage share on the corporate balance is larger than its positive effect on the household balance, which is consistent with the negative coefficient on the wage share in the current account regressions.

As can be seen in Columns 7-9, neither the personal nor the functional distribution of income have statistically significant effects on the fiscal balance.

Taken together, the results reported in Table 2.4 suggest that an increase in personal income inequality leads to a decrease of the current account via its effect on the household

[12] Estimations for the sectoral balances using the smaller model with four-year averages yield rather poor results.

[13] This result is robust to using the total economy wage share or the manufacturing wage share.

financial balance, while a fall in the wage share leads to an increase in the current account via its effect on the corporate financial balance.

2.5 Concluding remarks

In this chapter, we have analyzed the link between income distribution and the current account for the period 1972-2007. We find that trends in the distribution of income, both in terms of personal income inequality and factor shares, can explain a substantial fraction of the global current account imbalances observed prior to the Great Recession.

Different theoretical explanations of our finding are possible. Our preferred hypothesis is that trickle-down consumption (Bertrand and Morse, 2016), or expenditure cascades (Frank et al., 2014) explain the negative link between personal income inequality on the one hand, and household saving and the current account on the other. While this explanation appears to be especially relevant to the cases of the U.S. and the U.K., (top-end) income inequality has increased far less in Germany, Japan, and China, all of which had large current account surpluses before the Great Recession. Yet, in this latter group of countries the falling share of the national income going to wages appears to have weakened aggregate demand and contributed to the current account surpluses of these countries, primarily by raising corporate net lending. This view is consistent with traditional theories of underconsumption.

Taken at face value, our results suggest that if firms in Germany, Japan, or China had decided not to raise their profits retained within firms but to pay higher incomes to top-income households and if this had been translated into higher consumption spending by top-income households, then this may have triggered pronounced expenditure cascades/trickle-down consumption in these countries as well. However, a more comprehensive analysis of the country-specific effects of changes in income distribution would need to take account of differences in social norms and institutions. In countries like Germany, Japan, or China, imitation effects may have been smaller because high-income households decided, as owners of the corporate sector, to keep a higher share of their rising incomes as savings within firms. One reason why small and medium-sized firms in Germany or Japan have accumulated more savings than firms in the U.S. or U.K. may be that the bank-based financial systems of Germany and Japan make it more difficult for firms to access external finance (Tan et al., 2015). Moreover, in such countries as the U.S. and the U.K., expenditure cascades may have been corroborated by easy credit access for households and consumerist social norms. On the other hand, bank lending standards and social norms towards household debt may be more conservative in Japan and Germany. While such country-specific norms and institutions may be partly captured by country fixed effects in our estimations, additional research is required to analyze

the macroeconomic effects of income distribution in different institutional contexts (see Behringer and van Treeck, 2017).

In their analysis of current account determinants, Ca' Zorzi et al. (2012) conclude that prior to the financial crisis, current account positions of major economies such as the U.S., U.K., Japan, and China were not aligned with fundamentals. While our results suggest that shifts in income distribution have significant explanatory power for current account balances, they certainly do not imply that current accounts were in "equilibrium" or "aligned with fundamentals". Our results imply that when inequality increases permanently, for example, this causes the current account to deteriorate so that the long-run national budget constraint may be violated. Hence, the estimated effects of changes in income distribution are best thought of as partial equilibrium effects and global rebalancing will require adjustments to take place either in the distribution of income, or via the exchange rate channel. In this sense, our results are evidence that country-specific shifts in the distribution of income over time have contributed to the rising instability of the international economic system.

Appendix to Chapter 2

2.A Description of data

Current account balance: The current account balance is defined as the sum of net exports of goods and services, net primary income, and net secondary income, in percent of GDP. Data for the current account balance are taken from the World Development Indicators (WDI) database (December 2012 version) provided by the World Bank.

Net foreign assets: Net foreign assets are measured as total assets minus total liabilities in percent of GDP. In order to capture possible nonlinearities in the relationship between the current account and the net foreign asset position, we include an interaction term to allow for a different slope when the net foreign asset position is below negative 60 percent of GDP. Data are taken from the updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007).

Output per worker, relative to top 3 economies: To measure a country's relative stage of economic development, we take the ratio of PPP converted GDP to working age population relative to the average productivity of three large economies (Germany, Japan, and the U.S.). We use real GDP at chained PPPs in constant 2005 U.S. Dollars from the Penn World Table (PWT, version 8.0) provided by Feenstra et al. (2015). Data on working age population are taken from the World Development Indicators (WDI) database (December 2014 version). Relative output per worker is also interacted with an indicator for capital account openness. The degree of a country's capital account openness is measured by the capital controls index developed by Quinn (1997) and Quinn and Toyoda (2008). This index measures the magnitude of capital account liberalization and is scaled between 0 (no capital controls) and 1 (full capital controls).

Output growth: We use real GDP growth in order to capture heterogeneity in the growth performance among countries. Data are taken from the World Development Indicators (WDI) database (December 2014 version).

Demographics: Demographic developments are proxied by the old-age dependency ratio, which is constructed as the ratio of the population older than 65 years to the population between 14 and 65, and population growth. Data are taken from the World Development Indicators (WDI) database (December 2014 version).

Reserve currency status: We use the share of a country's own currency in the total stock of world reserves as a proxy for the so-called "exorbitant privilege" of reserve currency

countries. Data are taken from the External Balance Assessment (EBA) methodology developed by Phillips et al. (2013). For the period 1972-1985 we use the latest available country-specific observation which is provided by the EBA dataset.

Output gap: The output gap is measured by the Hodrick-Prescott filter. This procedure removes the cyclical component from the long-term trend GDP. The HP filtered estimates of the output gap are based on data over the period 1970-2011. Data are in constant 2005 U.S. Dollars and taken from the Penn World Table (PWT, version 8.0).

Terms of trade gap: The terms of trade are defined as the ratio between the index of export prices and the index of import prices. The terms of trade gap is measured by the Hodrick-Prescott filter based on data over the period 1970-2014. We employ data from the OECD National Accounts Statistics database. For China, we use data from the World Development Indicators (WDI) database. The resulting terms of trade gap series is then interacted with an indicator of a country's trade openness. Trade openness is measured as the sum of exports and imports of goods and services in percent of GDP. Data are taken from the World Development Indicators (WDI) database (December 2014 version).

Private credit: We use private credit by deposit money banks and other financial institutions in percent of GDP as a proxy for both "financial excesses" and financial development. The variable measures the deviation from a country's current level of credit provided to households and non-financial corporations from its own historical average. Data are taken from the Global Financial Development Database (GFDD) provided by the World Bank (November 2013 version). For China, Germany, and the U.K., data on private credit by deposit money banks and other financial institutions are only available since 1987, 1992, and 1889, respectively. For these countries, we therefore complement the series with data on domestic credit provided to the private sector, also taken from the GFDD. The series are similar in terms of level and dynamics with correlations coefficients ranging between 0.978 (China) and 0.993 (U.K.).

Fiscal balance: The fiscal balance is defined as total general government revenue minus total general government expenditures in percent of GDP. We employ several sources for the fiscal balance. Our primary source is the Economic Outlook database (No. 96, November 2014) from the OECD. As the AMECO database of the European Commission and the World Economic Outlook (WEO) database from the IMF provide longer series for several countries, we complement the OECD series with data from these alternative sources. For France and Germany, we use series from the AMECO database. For Australia, China and Ireland, we employ data from the WEO database.

Corporate and household balance: The sectoral financial balances are defined as gross saving minus gross capital formation and other capital expenditures in percent of GDP. Our primary source for the sectoral financial balances is the AMECO database of the European Commission. However, as the AMECO database does not provide data for several countries of interest, we complement the AMECO series with data from alternative sources. For Australia, Canada, Ireland, New Zealand, and South Africa, we use data from the OECD National Accounts Statistics database. For China, we use data from the National Bureau of Statistics (NBS).

Wage share: We use the adjusted wage share of the total economy, the adjusted wage share of the manufacturing sector and an adjusted wage share of the private sector to proxy the functional income distribution. The adjusted wage share of the total economy is defined as compensation per employees as a percentage of nominal GDP at current factor cost per person employed. The adjusted wage share of the manufacturing sector is defined as compensation per employees as a percentage of nominal gross value added per person employed. Data are taken from the AMECO database of the European Commission. For China, we use data from Bai and Qian (2010). The construction of the adjusted private sector wage share is based on the adjusted wage share of the total economy. Since the wage share of the total economy is the sum of the private sector wage share and the government wage share weighted by their respective sizes, we use final consumption expenditure by the general government in percent of GDP as a measure for the size of the government sector. Data for final consumption expenditure of general government are taken from the OECD National Accounts Statistics database.

Top income shares: We use different top income shares from the World Top Incomes Database (WTID) as proxies for income inequality. These data are collected from personal income tax returns following the methodology outlined in Piketty (2003) and Piketty and Saez (2003). Income reported is typically gross total income and includes labor, business and capital income (and in a few cases also realized capital gains) before taxes and transfers. For Ireland, data on top 5% income shares are not available. We therefore use the mean of the top 1% income share and the top 10% income share.

Gini coefficient: As an alternative measure of income inequality we use the Gini coefficient of equivalized household disposable income (*i.e.* after taxes and transfers) of the Standardized Income Inequality Database (SWIID, version 5.0). For a detailed description of the dataset, see Solt (2016).

2.B Demeaning of explanatory variables

Since national current account balances are influenced by both domestic and foreign economic conditions, most explanatory variables are converted into deviations from a weighted sample mean. The sample mean is calculated across all countries for which data are available for a given time period. Country-specific weighted averages of foreign variables are then constructed as follows:

$$\widetilde{X}_{i,t} = X_{i,t} - \frac{\sum_{i=1}^{J} (W_{i,t} \cdot X_{i,t})}{\sum_{i=1}^{J} W_{i,t}} \tag{2.3}$$

where $X_{i,t}$ denotes the observation of the respective explanatory variable for country i and time period t, and $W_{i,t}$ stands for the weighting variable. For country-specific GDP weights we use data from the Penn World Table (PWT, version 8.0) provided by Feenstra et al. (2015). Since calculating the cross-country average might cause jumps in the data in time periods where a large country is added to the list, we also use average foreign trade flows over the period 2000-2007 to compute country-specific weighted averages of foreign variables as a robustness check. Data on bilateral trade are taken from the IMF Direction of Trade Statistics (DOTS) database.

Chapter 3

Varieties of capitalism and growth regimes: the role of income distribution[1]

3.1 Introduction

Since the global financial crisis of 2008, macroeconomists and comparative political economists have rediscovered a common interest in understanding the determinants of income distribution, as well as the implications of income distribution for economic efficiency and stability. It is now widely agreed that the rise of inequality in many countries since the 1980s poses a threat to not only political but also macroeconomic stability (e.g. Ostry et al., 2016). For instance, Kumhof et al. (2015) show how rising income inequality has contributed to the rise in household debt which triggered the financial crisis in the United States in 2007 (see also Rajan, 2010; van Treeck, 2014, for a survey). However, it is not well understood why different countries developed different patterns of income distribution and how these are related to national growth models and macroeconomic imbalances. The more recent varieties of capitalism (VoC) literature seeks to explain why liberal market economies (LMEs) and coordinated market economies (CMEs) tended to be characterized by (increasingly excessive) current account deficits and surpluses, respectively, but they do not see a causal link between income distribution and external imbalances (e.g. Hall, 2014; Hope and Soskice, 2016). The emerging literature on the "growth model perspective", by contrast, argues that income distribution is key to understanding how different national growth models such as "export-led growth" and "consumption-led growth financed by credit" contributed to the global current account imbalances that were an important contributing factor to the global financial crisis.

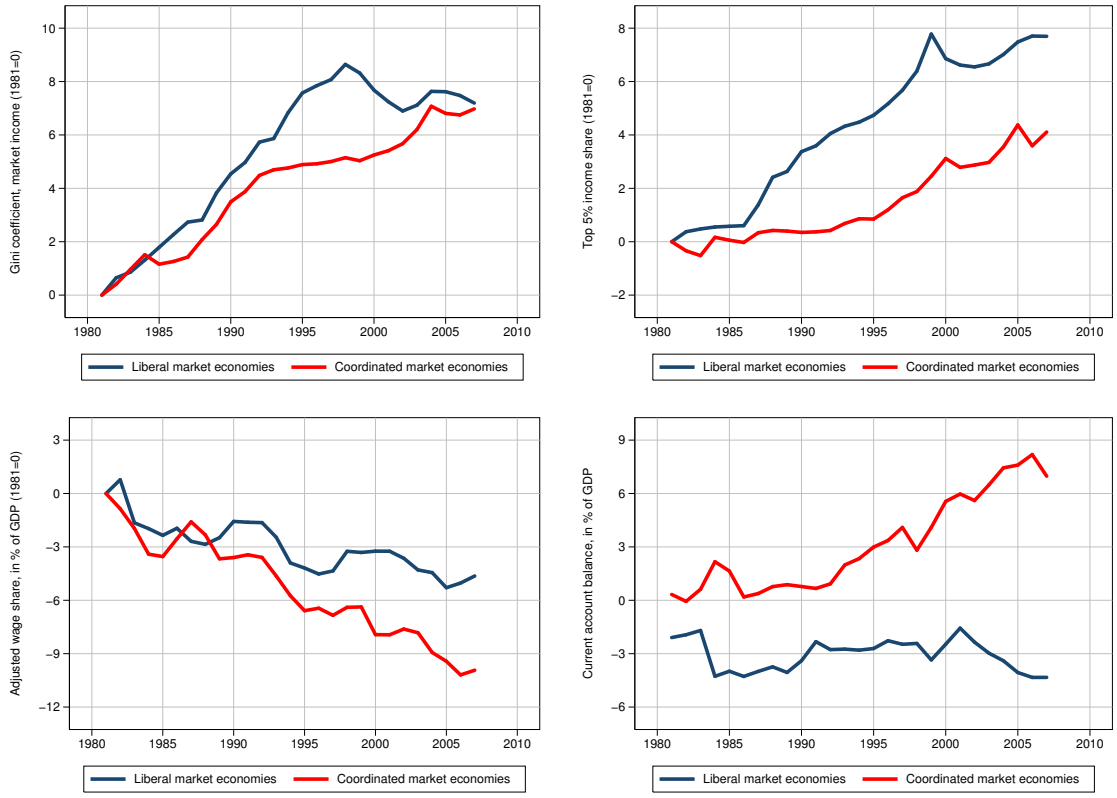
In this chapter, we analyze the links between income distribution, varieties of capitalism, and growth models. We agree with Baccaro and Pontusson (2016) that trends in income distribution are crucial for understanding the emergence of national growth regimes and global imbalances. However, we argue that the growth model perspective proposed by Baccaro and Pontusson (2016), fails to clearly distinguish between the poten-

[1] This chapter is based on joint work with Till van Treeck. An earlier version of this chapter was published as "Varieties of capitalism and growth regimes: the role of income distribution", FMM Working Paper 09-2017, see Behringer and van Treeck (2017).

tial macroeconomic implications of the functional distribution of income (wages versus profits) on the one hand, and the personal distribution of income (top-end income inequality in particular) on the other hand. Meanwhile, the VoC literature predicts that CMEs, owing to a higher degree of wage bargaining coordination, produce lower wage dispersion and lower personal income inequality than LMEs, but it has no explicit theories about the determinants of functional income distribution and about the implications of income distribution (personal and functional) for aggregate demand and external imbalances. The present chapter starts from the observation that different groups of countries, despite confronting similar paths of technological change and globalization as well as financial and labor market liberalization, experienced rather different patterns of income distribution, with top-end personal income inequality increasing much more strongly in LMEs and wage shares decreasing considerably more strongly in CMEs (see Figure 3.1). We ask, firstly, how are these differences in income distribution related to the emergence, since the 1980s, of different growth models that have been characterized by current account surpluses in CMEs and current account deficits in LMEs (see Figure 3.1)? And secondly, what has been the role of differences in the coordination of wage bargaining across countries and over time in bringing about the different growth models by impacting either directly on the current account balance or indirectly on the distribution of income?

We contribute to answering these questions using a macro panel analysis of 18 industrialized countries over the period 1981-2007. In particular, we estimate current account regressions in which measures of personal and functional income distribution as well as of wage coordination are included alongside a number of standard control variables. We find that a rise in top-end personal income inequality (relative to trading partners) leads to a lower current account. By contrast, a fall in the wage share is associated with a higher current account. We can relate these findings to recent debates in the macroeconomics and comparative political economy literature. While different theoretical explanations of our results are possible, we argue that the finding of a negative effect of top-end personal income inequality on household saving and the current account is broadly consistent with theories of consumption grounded in the notion of upward-looking status comparisons, in the tradition of the relative income hypothesis (Duesenberry, 1949; Frank, 2005). These theories of "expenditure cascades" (Frank et al., 2014), "or trickle-down consumption" (Bertrand and Morse, 2016), can explain why the middle and upper-middle classes in such countries as the United States and the United Kingdom have reacted to their falling incomes (relative to households at the top of the income distribution) by reducing their financial savings in an attempt at keeping up with households above them in the income distribution ladder, who have increased their expenditures on positional goods in line with their strongly rising incomes. Such consumption externalities can be expected to be especially pronounced in LMEs, where such important positional goods as housing

Figure 3.1: Different measures of income distribution and current account balances



Notes: The figure shows the average change in, respectively, the top 5% household income share, the Gini coefficient of household market income, the adjusted wage share, and the current account balance in % of GDP, 1981-2007. The liberal market economies (LME) include Australia, Canada, New Zealand, the United Kingdom, and the United States. The coordinated market economies (CME) include Denmark, Finland, Germany, Japan, the Netherlands, Norway, Sweden, and Switzerland. For the adjusted wage share, New Zealand (LME) and Switzerland (CME) are excluded due to missing data over part of the 1981-2007 period.

or education are allocated via competitive markets (Hall and Gingerich, 2009), where the precautionary saving motive of households is relatively low due to fluid labor markets with relatively short job tenures and workers with general (rather than industry-specific) skills (Hall and Gingerich, 2009; Carlin and Soskice, 2009), and where, prior to the financial crisis, largely deregulated credit markets have allowed households to maintain their consumption despite falling incomes (van Treeck, 2014). In CMEs, by contrast, relative income effects on consumption owing to upward-looking status comparison were less pronounced because top household incomes increased far less, workers with specific skills have a higher demand for precautionary saving, credit markets are more regulated, and important positional goods are provided through government funding. Meanwhile, the firm sector in such countries as Germany and Japan, while paying lower dividends and top management salaries to the household sector than its counterparts in the United States or the United Kingdom, reacted to rising corporate profits with higher corporate

saving, thereby limiting household incomes and consumption demand.

According to the VoC perspective, the more coordinated wage bargaining institutions in CMEs explain both why the wage structure is more compressed and income inequality is lower in CMEs than in LMEs and why CMEs tend to run current account surpluses, whereas LMEs tend to rely much more heavily on domestic demand (see Hall and Gingerich, 2009; Iversen and Soskice, 2010; Hall, 2014; Hope and Soskice, 2016). The idea is that cross-sectoral coordination in wage bargaining provides incentives to the trade unions to implement nominal wage restraint, with the result of lower price inflation and higher export price competitiveness, and leads to more conservative monetary and fiscal policies which dampen domestic demand and imports, with the result of a higher current account (Hope and Soskice, 2016). Our current account regressions suggest that the coordination of wage bargaining played only a limited direct role in the emergence of current account imbalances when the effect of income inequality is controlled for. We hypothesize, however, that wage coordination (together with other institutional features that correlate with wage coordination) may affect both the aggregate wage share and personal income distribution, and hence indirectly the current account.

We estimate a number of panel regression models in which changes in, respectively, the wage share, top household income shares and the Gini coefficient of household market incomes are explained by technological change, globalization, and financial and labor market reforms. We show that including interaction terms accounting for the degree of coordination of wage bargaining may help explain the different patterns of income distribution in individual countries. Borrowing from the extensive VoC literature on wage coordination (e.g. Iversen and Soskice, 2010; Iversen and Soskice, 2012), we argue that in countries with a higher degree of wage coordination, trade unions managed to prevent a strong rise in top-end wage and income inequality. Despite the fall in unions' overall bargaining power, the institutional capacities of wage coordination have largely persisted in a number of major CMEs and hence unions have retained a larger influence on corporate decisions, including those related to top executive compensation. By contrast, countries with less centralized wage bargaining (LMEs), rely more on market forces to reset wages and prices. In these countries, and especially in the United States and the United Kingdom, the decline in unions' bargaining power has been accompanied by the emergence of a competitive market for managers, giving rise to an explosion of top executive compensation. The latter have contributed both to rising top-end personal income inequality and, somewhat paradoxically, to the stabilization of the wage share. Absent comparable increases in top wages in CMEs, wage shares in the more coordinated countries have fallen more strongly.

In this chapter, we expressly limit our focus of attention to the pre-crisis period, in line with the recent political economy debate about the relationship between varieties of capitalism and growth models (Baccaro and Pontusson, 2016; Hope and Soskice, 2016).

Clearly, the global financial crisis has revealed the unsustainability of national current account positions and, more broadly speaking, of the pre-crisis national growth models, or varieties of capitalism. It is still too early, however, to conjecture about how new growth models might emerge in the post-crisis period.

The remainder of this chapter is organized as follows. In Section 3.2, we briefly review the recent debate about varieties of capitalism and growth models. Section 3.3 offers a descriptive account of the evolution of income distribution and explains why the personal and the functional distribution of income are best analyzed jointly. In Section 3.4, we present theoretical considerations and empirical evidence on the implications of income distribution and wage coordination for national current account balances. We then investigate further into the links between wage bargaining institutions and different measures of income distribution in Section 3.5. Section 3.6 concludes with a discussion of our findings in light of the existing macroeconomics and comparative political economy literature.

3.2 Varieties of capitalism versus growth models?

The varieties of capitalism (VoC) approach to comparative political economy (e.g. Hall and Soskice, 2001) originally focused mostly on institutional complementarities across spheres of the political economy, including labor markets, markets for corporate finance, the system of skill formation, and inter-firm collaboration on research and development. It thus developed a theory of comparative institutional advantages, notably in the sphere of innovation where LMEs are better placed to sponsor radical innovation and CMEs to sponsor incremental innovation. Aggregate demand issues and the recognition of macroeconomic imbalances were brought into the VoC theory relatively late, partly in response to the challenge of the "growth model perspective" (Baccaro and Pontusson, 2016; Hope and Soskice, 2016). In our view, a blind spot of the VoC approach, highlighted by the growth model perspective, is the interaction of income distribution and aggregate demand. However, we will argue in this chapter that elements from the VoC approach and the growth model perspective can be fruitfully brought together to address this important link.

In a recent contribution, Baccaro and Pontusson (2016) criticize the VoC approach on two main grounds. Firstly, according to Baccaro and Pontusson (2016), the contemporary comparative political economy literature has been far too preoccupied with building typologies and classifying countries. This rather general criticism echoes earlier critiques of the rationalist-functionalist account of capitalist variety inherent in the VoC approach and its emphasis on the static reproduction of institutionalized economic relations in different, but coherent national political economies (Boyer, 2005; Streeck, 2010). For exam-

ple, Streeck (2010), in his summary of the "VoC Debate", points to four critical issues in the VoC approach that have been much debated in the literature, *i.e.*, the methodological nationalism, the functionalism, the economism, and the static comparativism that underlie the VoC approach. In particular, many authors have criticized the bipolarity of the typology proposed by Hall and Soskice (2001) (LMEs versus CMEs). Interestingly, the VoC approach has been criticized both for downplaying the complexity and diversity of national capitalisms (e.g. Amable, 2003; Boyer, 2005) and for failing to reccognize the similarity of recent changes within different models of capitalism. In fact, while Baccaro and Pontusson (2016) emphasize that their "growth models" are more numerous and more unstable than Hall and Soskice's "varieties of capitalism," Baccaro and Benassi (2017, pp. 3-4) point to "a common liberalizing tendency in the trajectory of industrial relations institutions, as everywhere employer discretion has expanded and the balance of class power has shifted against labor." They are thus in agreement with Streeck (2009, p. 1), who argues that "the time has come to think, again, about the commonalities of capitalism".

Secondly, and more concretely, Baccaro and Pontusson (2016) criticize that the role of changes to income distribution to (different components of) aggregate demand and thus the emergence of growth models has not featured prominently in the comparative political economy literature to date. As an alternative, Baccaro and Pontusson (2016) propose to seek inspiration from neo-Kaleckian and, more generally, Post Keynesian, macroeconomics, while they see the VoC approach as being more compatible with New Keynesian macroeconomics. In line with the neo-Kaleckian concept of wage-led growth (see Lavoie and Stockhammer, 2012), Baccaro and Pontusson (2016) argue that the decrease of the wage share and the rise in income inequality observed in most advanced economies since the early 1980s could *prima facie* be expected to reduce consumption and aggregate demand and hence economic growth. The basic argument behind this is the notion that workers have a higher propensity to spend than capitalists, and low-income households have a lower saving rate than high-income households so that either a fall in the wage share or a rise in personal income inequality reduces aggregate demand. Yet, according to Baccaro and Pontusson (2016) (and an extensive Post Keynesian literature), two new growth models emerged since the 1980s that have replaced mass consumption financed by mass incomes by new drivers of aggregate demand growth. These two growth models go under the labels "consumption-led growth financed by credit" and "export-led growth". Baccaro and Pontusson (2016) argue that both growth models are unstable and that the resulting global imbalances have contributed to the outbreak of the global financial crisis in 2008.[2] However, Baccaro and Pontusson (2016) offer no theo-

[2]With its focus on aggregate demand drivers, the growth model perspective is closely related to the régulation approach in so far as régulation theory starts from a long-term analysis of the transformation of capitalism in order to search for alternatives to the Fordist regime that emerged after the second world war and

retical explanation of why different growth models have developed in particular countries. Rather, they emphasize that distributional trends in various countries during recent decades have gone contrary to the conventional wisdom of VoC. For instance, by some measures the income distribution has become particularly more unequal in a number of core CMEs, such as Germany, in spite of their being characterized by stronger wage coordination and higher union membership, compared with LMEs. In the next Section, we summarize our own account of the diverging patterns of income distribution in CMEs and LMEs apparent in Figure 3.1.

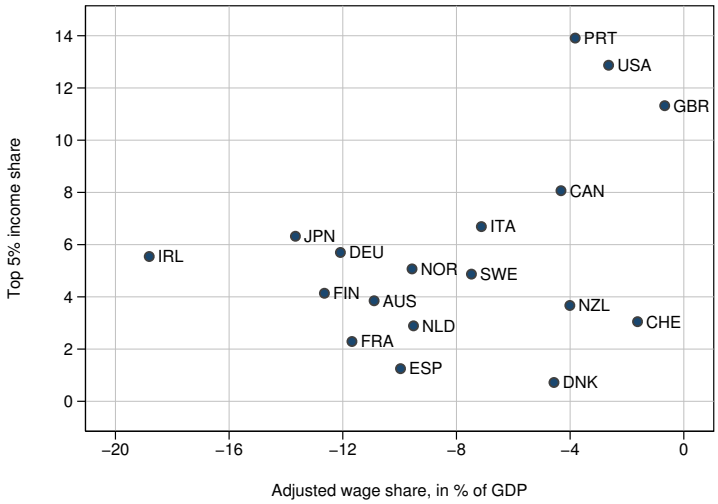
3.3 Personal and functional income distribution

Baccaro and Pontusson (2016, p. 179) criticize the "conventional wisdom of the CPE literature (which) holds that market forces, associated with technological change and globalization, have been a source of rising earnings inequality in OECD countries, but institutional arrangements characteristic of coordinated market economies have muted or deflected these pressures. By and large, the existing literature conceives rising earnings inequality as an LME-specific phenomenon." However, they report that the 90-10 earnings ratio of full-time employees increased more strongly in a number of core CME countries, including Germany, than in such LME countries as New Zealand, Canada, the United Kingdom during the period 1995-2010/11. On this basis, they criticize the VoC literature for having "celebrated Germany's coordinated market economy as a 'worker-friendly' and egalitarian alternative to the neoliberal model of stock-market capitalism" (p. 178). Indeed, part of the conventional wisdom promoted by the VoC literature is that CMEs tend to be better protected against rising inequality. For example, Hall and Gingerich (2009, p. 477), argue that "LMEs respond to economic challenges by relying more heavily on competitive markets to reset wages and prices, we should see more rapid increases in income inequality there in response to the recent experiences of globalization." To substantiate this view, they show that the Gini coefficient of household disposable income has increased stronger in LMEs than in CMEs in the period 1980-1995.

In our view, the 90-10 earnings ratio and the Gini coefficient of household income are not ideal measures for comparing patterns of income distribution across countries. Firstly, they provide no indication as to whether any given rise in inequality is due to changes in the upper or in the lower part of the earnings or income distribution. Secondly, they ignore trends in inequality at the top of the distribution. By definition, top incomes are not captured in the 90-10 earnings ratio. They are also underestimated in the Gini coefficient which is typically constructed on the basis of household surveys, in which top income groups are notoriously underrepresented. Moreover, due to its math-

collapsed during the 1970s (Boyer, 1988; Bowles and Boyer, 1990; Boyer, 2005).

Figure 3.2: Functional and personal income distribution



Notes: The figure shows the change in the adjusted wage share (horizontal axis) against the change in the top 5% household income share (vertical axis), 1981-2007. For New Zealand changes are shown for the period 1986-2007. For Portugal changes are shown for the period 1981-2005. For Switzerland changes are shown for the period 1991-2007. For all other countries, changes are calculated for the period 1981-2007.

ematical construction, the Gini coefficient is rather insensitive to changes at the tails of the distribution. Top incomes are by no means negligible from a macroeconomic perspective: According to tax data, the incomes of the top 10, 5, and 1% of households to date account for respectively more than 40, 30, and 15% of total household income in the United States and in the United Kingdom. Thirdly, in our view measures of household income inequality need to be analyzed jointly with measures of the functional distribution of income. In this regard, we agree with the criticism by Baccaro and Pontusson (2016, p. 184) of scholars in comparative political economy for having been "strikingly oblivious to the distribution of income between labor and capital". Baccaro and Pontusson (2016) report wage shares, adjusted for self-employment, for a number of countries since the 1960s, and point to the "striking feature" that the wage share has held up better in the United Kingdom than in several other countries including Germany and Sweden, "all characterized by more coordinated systems of wage bargaining and by less dramatic declines of union membership". We would argue, however, that the relative stability of the wage share in the United Kingdom is surprising only at first sight. In fact, it can at least in part be seen as a reflection of the strong increase in top management compensation, counted as wage income in the national accounts, that has also driven the rise in top household income shares.

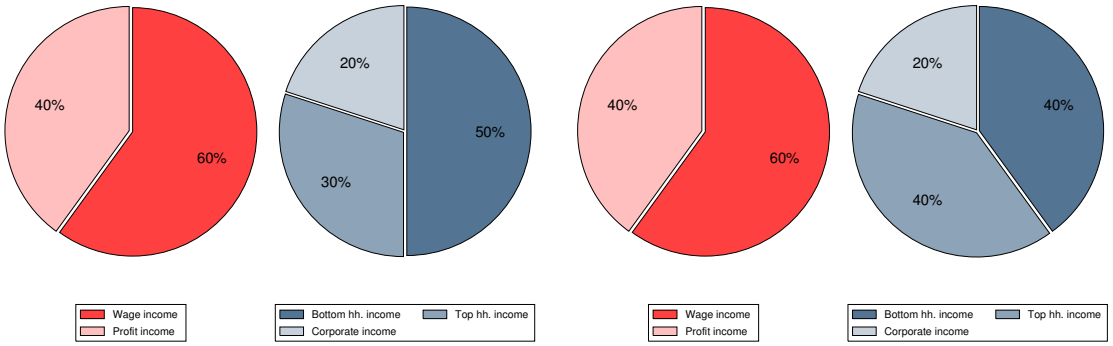
In Figure 3.2, we propose an alternative summary of distributional shifts across 18 OECD countries in the period 1981-2007, taking into account changes in both the functional and the personal income distribution. The functional distribution is captured by

the share of wages in the gross national product at current factor costs, adjusted for self-employment. Top-end personal income inequality is given by the share of the top 5% households in aggregate pre-tax household income. Unfortunately, comprehensive data for top-end earnings inequality are not available on a cross-time, cross-country level. Yet, we know that the phenomenal rise of top-end personal income inequality since the 1980s in many countries has been driven to a considerable extent by rising earnings inequality, driven to a large degree by winner-take-all markets for top corporate executives present especially in the Anglo Saxon economies (Atkinson et al., 2011). As can be clearly seen in Figure 3.2, it is by no means the case that countries with a larger fall in the wage share have also experienced a stronger increase in top-end personal income inequality. On the contrary, there is a negative correlation between changes in wages shares and top household income shares. The United States, the United Kingdom and, to a lesser extent, Canada, *i.e.*, the three largest LMEs, stand out with very pronounced increases in the top household income share but rather limited falls in the wage share. By contrast, Germany and Japan, the two largest CMEs, saw much smaller changes in the top income share but much more significant falls in the wage share. As can also be seen in Figure 3.2, a number of smaller countries typically classified as LMEs and CMEs show somewhat different patterns of income distribution. Both Denmark, a classic case of a CME, and New Zealand, typically considered an LME, experienced relatively weak increases in top household income shares and relatively weak decreases in the wage share. Nevertheless, the overall pattern that is apparent in Figure 3.2 especially for the largest LMEs and CMEs which have been mainly responsible for the global current account imbalances, is interesting. Rising earnings and income inequality in general is not an LME-specific phenomenon, as rightly emphasized by Baccaro and Pontusson (2016). For instance, the Gini coefficient of household market income has increased more strongly in Germany than in the United States and the United Kingdom since the early 1980s (see Figure 3.6). Yet, no CME has experienced a similar explosion of incomes at the very top of the income distribution that has characterized the U.S. and the U.K. economies over the past decades. And, with top executive wages increasing less in CMEs, the share of aggregate wages in the national income has decreased more strongly than in the large LMEs. In Section 3.5, we will return to the question of how changes in income distribution may be related to different degrees in wage coordination.

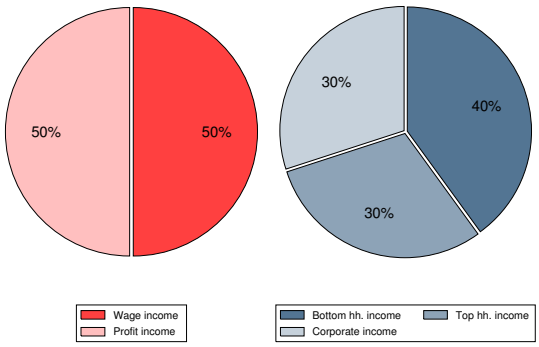
Before turning to the question as to how income distribution affects national growth models in terms of current account balances, we emphasize the important distinction of functional and personal income distribution conceptually with a hypothetical numerical example. Figure 3.3 shows the national income of a private economy, which is distributed between wages and profits (functional distribution) and between bottom and top household income (personal income distribution) and corporate income. In Scenario 1 (Figure 3.3a), the wage share is 60% of national income, and the profit share is 40%. Half of to-

Figure 3.3: Numerical example of changes in functional and personal income distribution

(a) Scenario 1 **(b)** Scenario 2



(c) Scenario 3



tal profits, *i.e.*, 20% of national income, are retained by corporations (corporate income), so that 80% of the national income accrue to the household sector. The top household income share is 37.5% (top household income accounts for 30% of the national income). In Scenario 2 (Figure 3.3b), which could be called the LME scenario, the wage share remains constant, but personal income inequality increases, compared with Scenario 1. Top household income increases from 30 to 40% of national income, *i.e.*, the top household income share increases from 37.5 to 50%. In Scenario 3 (Figure 3.3c), which may be considered the CME scenario, the wage share decreases from 60 to 50%, and the profit share increases from 40 to 50%. The rise in profit translates into a fall of bottom household income from 50% of national income to 40%, while retained profits increase from 20 to 30% of national income. In this Scenario, the top income share only increases to 43%, compared with 37.5% in Scenario 1 and 50% in Scenario 2. Yet, it can certainly not be said that either Scenario 2 or Scenario 3 is more "worker-friendly" and "egalitarian" in any comprehensive sense, given the stronger rise in the top household income share in Scenario 2 and the stronger fall in the wage share in Scenario 3. Clearly, the rise of cor-

porate income in Scenario 3 mainly benefits top income households who largely own the corporate sector, whereas bottom income households hardly own any corporate wealth.

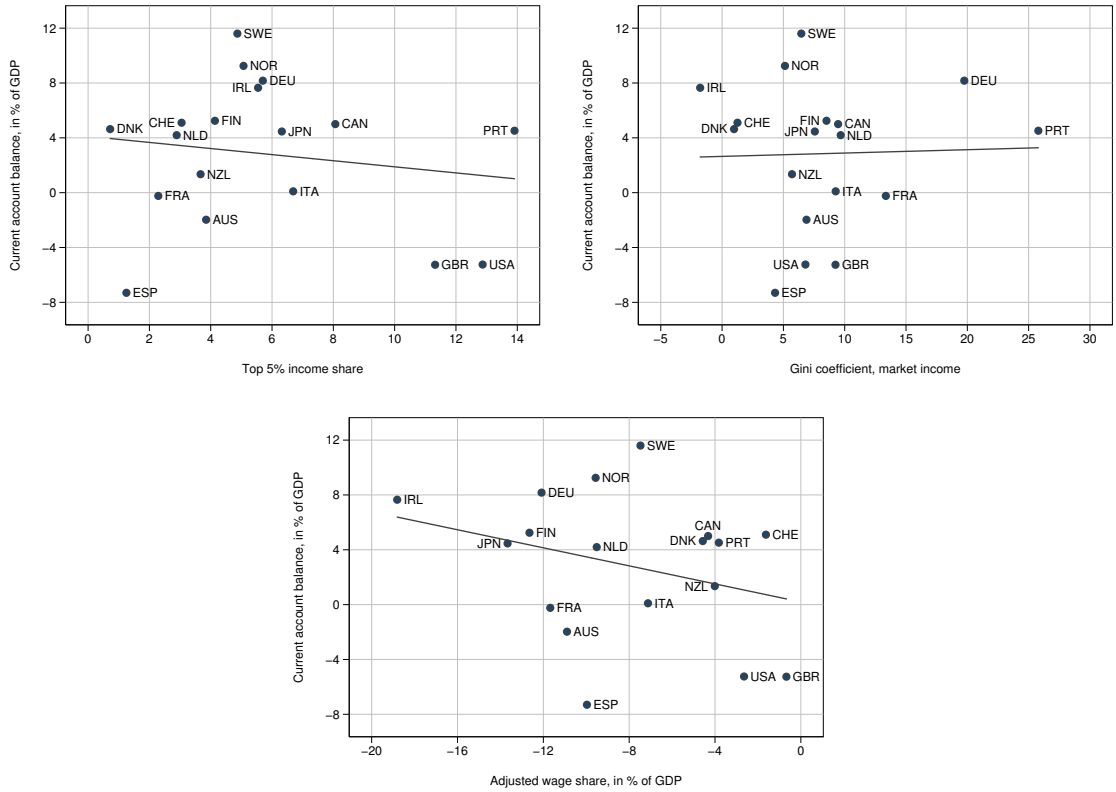
3.4 Macroeconomic imbalances

3.4.1 The role of income distribution

Next, we discuss the possible implications of different patterns of income distribution for national growth models and current account balances. Figure 3.4 shows plots of changes in national current account balances on the one hand and changes in, respectively, top household income shares and wage shares on the other hand. The negative correlation between changes in top income shares and the current account, *i.e.*, the national saving-investment balance, runs counter the traditional Keynesian and post-Keynesian argument that higher inequality reduces aggregate demand because "the rich save more than the poor". However, it is consistent with the notion of relative income effects with upward-looking status comparisons. In particular, the expenditure cascades, or trickle-down consumption hypothesis predicts that the negative effect of rising inequality on saving will be the more pronounced, the further a shift in inequality occurs towards the top of the income distribution (Frank et al., 2014). One may therefore expect that the negative effect of a rise in top household income shares on the current account is larger than the effect of a rise in the Gini coefficient of household income, as suggested by Figure 3.4. When middle and upper-middle income groups reduce their saving in an attempt to maintain their relative consumption of positional goods relative to the top income groups, the effects on the aggregate household saving rate, and hence the current account, will be relatively large because of the large share of the middle and upper-middle class in aggregate household income. This is why top income shares, rather than broad measures of inequality such as the Gini coefficient of household income, are the more instructive measure in this context. Notice that the relative income hypothesis with upward-looking status comparisons also predicts that "the rich save more than the poor". But, in contrast to traditional Keynesian reasoning, a rise in inequality may reduce the aggregate saving rate when the gap between the group-specific saving rates of high- and low-income households increases as a result of low-income groups reducing their saving rates with a view to limiting the decline in their relative consumption levels.

Clearly, the expenditure cascades model appears to be especially relevant to the United States and the United Kingdom during the period prior to the global financial crisis of 2008 when these two countries ran large current account deficits. During that period, the increase of top income shares was especially pronounced, and households had easy access to credit in a context of largely deregulated credit markets. There is considerable evidence that middle and upper-middle class households have traded off their retirement

Figure 3.4: Income distribution and current account balances



Notes: The figure shows the change in, respectively, the top 5% household income share, the Gini coefficient of household market income, and the adjusted wage share (horizontal axis) against the change in the current account balance in % of GDP (vertical axis), 1981-2007. For New Zealand changes are shown for the period 1986-2007. For Portugal changes are shown for the period 1981-2005. For Switzerland changes are shown for the period 1991-2007. For all other countries, changes are calculated for the period 1981-2007.

savings for the purchasing of positional goods such as education, housing, or health care, which are allocated largely through private markets especially in the United States (e.g. van Treeck, 2014; Frank et al., 2014; Bertrand and Morse, 2016). Saez and Zucman (2014) report saving rates for different percentiles in the U.S. wealth distribution, which suggest that the decrease of the aggregate U.S. household saving rate was driven largely by the decrease in the saving rates of the top 10 to 1% of the wealth distribution. While this is consistent with the notion of consumption externalities with upward-looking status comparisons, it is also evidence against the alternative explanation of the decline in saving being driven by a pure wealth effect with a homogenous propensity to consume out of wealth across income or wealth groups. Kumhof et al. (2012) and Behringer and van Treeck (2018) also find a negative link between top income shares and the current account balance, controlling for other determinants of the current account.

It is, however, quite likely that the trickle-down consumption hypothesis has ceased to be an accurate description of the saving behavior of households in the United States

and the United Kingdom since the outbreak of the global financial crisis in 2008. The rise in household debt that has accompanied the decline in the relative incomes of the bottom 95% or so of the population since the 1980s has turned out to be unsustainable, and it seems unlikely that private consumption will once again become the main driver of aggregate demand growth without a stronger growth of middle-class incomes (Kumhof et al., 2015). As noted by Baccaro and Pontusson (2016, p. 176), growth regimes are "numerous and unstable" and contingent on specific historical circumstances.

The negative relation between changes in current account balances and wage shares is certainly less surprising for the growth model perspective. As noted by Baccaro and Pontusson (2016, p. 183) in their summary of neo-Kaleckian macroeconomics: "a wage-share increase will boost aggregate consumption, and possibly boost investment as well, but it will most likely lead to a deterioration of the current account balance." In our view, the main effect of a change in the wage share on the current account is through the demand for imports. The underlying mechanisms can be succinctly summarized as follows. A fall in the wage share implies that a higher share of the national income goes to profits. Higher profits will typically be associated with higher profits retained by corporations, which translates into lower household income. Lower household income in turn reduces consumption demand because households tend to have a higher propensity to consume out of wages and distributed profits than out of wealth (higher retained profits by corporations increase shareholders' wealth). Potential trickle-down consumption effects will also be smaller, if a higher share of the national income remains within the corporate sector as savings, rather than being paid out to, and consumed by, top income households. On the other hand, a higher profit share may also give a boost to investment either by signaling an increase in the profitability of investment or by easing corporate financing constraints. In a wage-led growth regime, the positive effects of a higher profit share on investment are relatively small compared to the negative effects of the associated fall in the wage share on consumption. We hypothesize that the strong decrease of the wage share in such important current account surplus countries as Germany and Japan prior to the global financial crisis contributed to the weakness of domestic demand in these countries.

Notice that the macroeconomic effects of a fall in the wage share are conceptually very different from those of a rise in personal income inequality (see Belabed et al., 2017 for a discussion). In our view it can not generally be expected that "shifts within the distribution of wage income, for example, redistribution from super-managers to low-wage workers, would have similar effects to a redistribution from profits to wages" (Baccaro and Benassi, 2017, p. 6). In this particular respect, Baccaro and Pontusson (2016) in our view provide an inaccurate representation of the mechanisms by which a fall in the wage share affects aggregate demand and the current account in neo-Kaleckian models. They argue that a fall in the wage share affects consumption negatively if and only if

"the propensity to consume varies negatively with income, such that rich individuals (or households) consume less and save more than poor individuals" (p. 182). Yet, in the seminal article by Bhaduri and Marglin (1990), on which much of the neo-Kaleckian literature on "wage-led growth" is based, the wage share impacts consumption by affecting the distribution between corporate and household income, while it is assumed that households have a unique propensity to consume out of wages and distributed profits.

The hypothesis of a negative link between the wage share and the current account is somewhat different from the VoC argument that CMEs, with their high degree of wage coordination, can successfully engineer wage moderation and thus enhance their export performance and produce current account surpluses. While the wage share (real unit labor costs) primarily affects imports by raising or lowering private domestic demand, wage coordination and wage moderation affect net exports also through a number of other channels that are not directly related to income distribution: firstly, by lowering nominal unit labor costs, and hence price inflation, thus boosting export price competitiveness, and secondly, by leading the Central Bank and the government, respectively, to conduct more conservative monetary and fiscal policies with the result of relatively lower domestic demand (contributing further to lower price inflation and a lower exchange rate) in CMEs compared to non-CMEs (e.g. Hope and Soskice, 2016; Iversen and Soskice, 2012).

Before turning to the panel estimation analysis, let us briefly restate our hypotheses. Firstly, an increase in personal income inequality, *i.e.*, the distribution of income across households, may lead to a decrease of the current account. One explanation would be that higher (top-end) personal income inequality increases households' demand for consumption under specific institutional and historical circumstances, if consumption externalities due to upward-looking status comparisons are large and top income groups increase their consumption expenditures with rising incomes. Secondly, a fall in the wage share likely leads to an increase in the current account. This outcome can be expected when higher profits at the expense of wages tend to boost corporate saving rather than top household incomes. Because the propensity to consume from income tends to be higher than from wealth, a rise in corporate profits tends to weaken private consumption. Thirdly, a higher degree of wage coordination may be linked to a higher current account, even when controlling for the wage share. The explanation here would be that higher wage coordination correlates with nominal wage moderation and more conservative monetary and fiscal policies.

3.4.2 Regression analysis

We estimate the implications of changes in functional and personal income distribution on national current account balances. The specifications of the current account equations

build on the panel estimation literature on current account determinants, which includes amongst others Chinn and Prasad (2003), Lee et al. (2008), Phillips et al. (2013). We regress the current account on a set of standard explanatory variables plus different measures of functional and personal income distribution as well as measures of wage coordination:

$$CA_{i,t} = \beta_0 + X_{i,t}\Gamma + \beta_1 WS_{i,t} + \beta_2 INEQ_{i,t} + \beta_3 CENT_{i,t} + \varepsilon_{i,t} \tag{3.1}$$

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$ denote the cross-sectional and time dimensions, respectively. The dependent variable $CA_{i,t}$ is the current account balance in percent of GDP and $X_{i,t}$ is a set of standard explanatory variables that are frequently used in the literature on current account determinants, including net foreign assets (NFA), output per worker, demographics, terms of trade, private credit, and the fiscal balance. $WS_{i,t}$ refers to the wage share, $INEQ_{i,t}$ refers to different measures of personal income inequality, and $CENT_{i,t}$ is a summary measure of centralization of wage bargaining. $\varepsilon_{i,t}$ is a residual error term with zero mean. We work with an unbalanced panel that includes 18 countries for the period 1981-2007: Australia, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Variable definitions and data sources are provided in Appendix 3.A.

The index of wage centralization is based on the methodology proposed by Iversen (1999) and combines data on the concentration or fragmentation of trade unions with information on the intra- and inter-organizational degree of unity (or cohesiveness), and the degree of authority of confederations over their affiliates, and of affiliates over their (workplace or company) members (see Visser, 2015). As discussed above, the VoC literature suggests that higher union centralization, or at least cross-sectoral coordination in wage bargaining, causes a higher current account by providing incentives to the trade unions to implement nominal wage restraint, with the result of lower price inflation and higher export price competitiveness, and by leading to more conservative monetary and fiscal policies. Our own hypothesis, which is not necessarily inconsistent with but may complements the VoC argument, is that the functional and personal distribution of income affects the current account. By including both, wage centralization and income distribution, in the current account regression, we can estimate the relative importance and potential interrelatedness of these different channels.

Most of the explanatory variables in the current account specifications need to be converted into deviations from a GDP-weighted sample mean. That is, each country's variables are measured relative to a weighted average of other countries' values prevailing at the same time (see Appendix 3.B for details). The cross-sectional demeaning accounts for the fact that a given economy's current account is by nature measured relative to other countries, so that it must be determined by both its own and its trading partners' charac-

Table 3.1: Current account regression model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Regressors	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA
L.Net foreign assets (% of GDP)	0.057***	0.060***	0.055***	0.060***	0.060***	0.058***	0.063***	0.059***	0.062***	0.064***	0.063***	0.065***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.088***	-0.095***	-0.085***	-0.093***	-0.089***	-0.086***	-0.094***	-0.093***	-0.097***	-0.096***	-0.094***	-0.097***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)	(0.020)	(0.020)	(0.019)
L.Output/worker (rel. to top 3 economies)	-0.021	-0.035	-0.022	-0.019	-0.027	-0.029	-0.025	-0.036	-0.027	-0.042	-0.043	-0.035
	(0.043)	(0.044)	(0.043)	(0.044)	(0.042)	(0.042)	(0.043)	(0.043)	(0.044)	(0.043)	(0.043)	(0.043)
L.Output/worker × Capital openness	0.089*	0.097*	0.090*	0.085*	0.087*	0.088*	0.083*	0.098**	0.090*	0.096**	0.096**	0.089*
	(0.049)	(0.050)	(0.050)	(0.050)	(0.048)	(0.048)	(0.049)	(0.050)	(0.050)	(0.049)	(0.049)	(0.049)
Dependency ratio	-0.059	-0.072	-0.029	-0.102	-0.079	-0.049	-0.117	-0.050	-0.102	-0.092	-0.069	-0.118
	(0.075)	(0.075)	(0.077)	(0.076)	(0.076)	(0.078)	(0.078)	(0.077)	(0.075)	(0.077)	(0.078)	(0.078)
Population growth	-2.246***	-2.199***	-2.247***	-2.268***	-2.333***	-2.332***	-2.331***	-2.223***	-2.250***	-2.272***	-2.290***	-2.311***
	(0.449)	(0.452)	(0.453)	(0.456)	(0.449)	(0.453)	(0.459)	(0.453)	(0.456)	(0.453)	(0.456)	(0.458)
Reserve currency status	-0.043***	-0.031**	-0.039***	-0.029**	-0.040***	-0.036***	-0.027**	-0.028**	-0.025**	-0.028**	-0.025**	-0.022*
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.013)
Output gap	-0.389***	-0.394***	-0.391***	-0.390***	-0.390***	-0.393***	-0.390***	-0.398***	-0.394***	-0.395***	-0.398***	-0.394***
	(0.087)	(0.087)	(0.086)	(0.087)	(0.086)	(0.086)	(0.086)	(0.087)	(0.087)	(0.086)	(0.085)	(0.086)
Terms of trade gap × Trade openness	0.455***	0.459***	0.451***	0.456***	0.451***	0.447***	0.453***	0.455***	0.458***	0.455***	0.451***	0.454***
	(0.074)	(0.074)	(0.074)	(0.074)	(0.073)	(0.074)	(0.073)	(0.074)	(0.074)	(0.073)	(0.073)	(0.073)
Private credit (% of GDP)	-0.047***	-0.046***	-0.047***	-0.047***	-0.044***	-0.044***	-0.044***	-0.047***	-0.047***	-0.043***	-0.043***	-0.043***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
L.Fiscal balance (% of GDP)	0.150***	0.142***	0.143***	0.127***	0.137***	0.130***	0.114**	0.139***	0.128***	0.125***	0.122**	0.114**
	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Centralization of wage bargaining	-	0.041***	-	-	-	-	-	0.040***	0.023	0.043***	0.041***	0.026
		(0.015)						(0.015)	(0.017)	(0.015)	(0.015)	(0.017)
L.Gini coefficient	-	-	-0.059	-	-	-0.060	-	-0.051	-	-	-0.050	-
			(0.047)			(0.047)		(0.047)			(0.047)	
L.Top 5% income share	-	-	-	-0.187***	-	-	-0.182***	-	-0.149**	-	-	-0.139**
				(0.057)			(0.058)		(0.066)			(0.066)
L.Adj. wage share	-	-	-	-	-0.125*	-0.127*	-0.119*	-	-	-0.136**	-0.136**	-0.126*
					(0.065)	(0.066)	(0.066)			(0.066)	(0.066)	(0.066)
Observations	466	466	466	466	466	466	466	466	466	466	466	466
Countries	18	18	18	18	18	18	18	18	18	18	18	18
R-squared	0.656	0.680	0.662	0.688	0.654	0.660	0.686	0.685	0.693	0.680	0.685	0.692
Rho	0.679	0.680	0.683	0.682	0.677	0.682	0.684	0.678	0.678	0.683	0.682	0.682

Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 3.A for a detailed description of the data.

teristics. The estimations are performed with annual observations. We use pooled GLS with a panel-wide AR(1) correction to deal with autocorrelation.[3] The choice of control variables largely follows Phillips et al. (2013), but we leave out a number of variables that are relevant primarily for developing countries or that turned out to be insignificant.

Table 3.1 presents the results for different variants of Equation 3.1.[4] The estimates for a standard model without wage centralization and income distribution are shown in Columns 1. Estimated coefficients are mostly statistically significant and have expected signs and plausible magnitudes in line with previous studies (see Lee et al., 2008; Phillips et al., 2013). Let us briefly go through the various control variables, before turning to the discussion of the effects of income distribution. The 0.06 coefficient on lagged NFA implies that an increase in NFA of 10 percent of GDP raises the current account balance by about 0.6 percent of GDP. The sign of the coefficient is theoretically ambiguous, but the positive coefficient estimated here is consistent with previous findings (Chinn and Prasad, 2003; Lee et al., 2008). In line with Phillips et al. (2013), we include an interaction term allowing for a non-linear relationship between the current account and the NFA position. Relative output per worker is included in order to capture catching-up effects, suggesting that economies with a relatively low capital stock tend to be net importers of capital. The catching-up term is small and marginally statistically significant when interacted with capital account openness. In our sample of industrialized economies, it is unsurprising that catching-up effects are small. The output gap is included to control for business cycle effects. In our regressions, the output gap is highly statistically significant, reflecting the counter-cyclical movement of the trade balance and the current account. Demographic effects are proxied via inclusion of the dependency ratio and population growth as explanatory variables. Countries with reserve currency status tend to have more negative current accounts. The terms of trade, interacted with trade openness are a further conventional control variable and are positively linked with the current account. Private credit is a proxy for financial development and is negatively linked with the current account. The positive coefficient on the fiscal balance implies that an increase in the government budget balance (relative to trading partners) leads to an increase in the current account balance in percent of GDP. This result is typically interpreted as evidence against the concept of Ricardian equivalence. In the case of strict Ricardian equivalence, an increase in the government deficit will be fully offset by rational consumers immediately raising their savings in preparation for higher anticipated tax payments in the future.

Column 2 of Table 3.1 presents the result for a model in which wage centralization was included as an additional regressor. The positive and significant coefficient on that

[3]The current account models are estimated without fixed effects, following the literature (see, amongst others, Chinn and Prasad, 2003; Phillips et al., 2013).

[4]All our estimation results are robust to controlling for cross-sectional correlation of the errors.

Table 3.2: Current account regression model: robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Regressors	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA	CA
L.Net foreign assets (% of GDP)	0.059***	0.062***	0.058***	0.063***	0.063***	0.062***	0.067***	0.062***	0.064***	0.067***	0.066***	0.069***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.092***	-0.099***	-0.090***	-0.099***	-0.094***	-0.092***	-0.100***	-0.098***	-0.102***	-0.101***	-0.100***	-0.103***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.019)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
L.Output/worker (rel. to top 3 economies)	-0.023	-0.015	-0.024	-0.021	-0.030	-0.031	-0.028	-0.015	-0.016	-0.022	-0.022	-0.023
	(0.045)	(0.045)	(0.045)	(0.045)	(0.043)	(0.043)	(0.044)	(0.044)	(0.045)	(0.044)	(0.043)	(0.044)
L.Output/worker × Capital openness	0.092*	0.092*	0.092*	0.087*	0.090*	0.090*	0.085*	0.091*	0.088*	0.089*	0.089*	0.086*
	(0.051)	(0.051)	(0.051)	(0.052)	(0.049)	(0.049)	(0.050)	(0.050)	(0.051)	(0.049)	(0.049)	(0.050)
Dependency ratio	-0.043	-0.156*	-0.014	-0.089	-0.065	-0.033	-0.107	-0.129	-0.156*	-0.185**	-0.155*	-0.183**
	(0.077)	(0.083)	(0.079)	(0.077)	(0.077)	(0.079)	(0.079)	(0.082)	(0.081)	(0.084)	(0.083)	(0.083)
Population growth	-2.218***	-2.186***	-2.220***	-2.271***	-2.311***	-2.315***	-2.346***	-2.247***	-2.242***	-2.286***	-2.335***	-2.333***
	(0.450)	(0.448)	(0.453)	(0.457)	(0.452)	(0.456)	(0.461)	(0.448)	(0.451)	(0.449)	(0.452)	(0.453)
Reserve currency status	-0.041***	-0.031**	-0.037***	-0.026**	-0.039***	-0.034***	-0.023*	-0.023*	-0.024*	-0.028**	-0.019	-0.021*
	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Output gap	-0.426***	-0.429***	-0.430***	-0.427***	-0.428***	-0.432***	-0.428***	-0.441***	-0.430***	-0.432***	-0.442***	-0.432***
	(0.088)	(0.086)	(0.087)	(0.087)	(0.087)	(0.086)	(0.086)	(0.086)	(0.087)	(0.085)	(0.085)	(0.085)
Terms of trade gap × Trade openness	0.492***	0.492***	0.487***	0.494***	0.488***	0.482***	0.490***	0.484***	0.494***	0.488***	0.479***	0.489***
	(0.075)	(0.074)	(0.076)	(0.075)	(0.074)	(0.075)	(0.074)	(0.076)	(0.074)	(0.073)	(0.074)	(0.073)
Private credit (% of GDP)	-0.044***	-0.043***	-0.044***	-0.044***	-0.041***	-0.041***	-0.040***	-0.044***	-0.043***	-0.040***	-0.040***	-0.040***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
L.Fiscal balance (% of GDP)	0.132***	0.107**	0.128***	0.111**	0.121**	0.116**	0.099**	0.104**	0.101**	0.093*	0.087*	0.088*
	(0.049)	(0.048)	(0.049)	(0.049)	(0.048)	(0.049)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
Adj. bargaining coverage rate	-	0.038***	-	-	-	-	-	0.042***	0.027**	0.040***	0.044***	0.029***
		(0.010)						(0.010)	(0.011)	(0.010)	(0.010)	(0.011)
L.Gini coefficient	-	-	-0.058	-	-	-0.062	-	-0.097**	-	-	-0.101**	-
			(0.048)			(0.048)		(0.049)			(0.049)	
L.Top 5% income share	-	-	-	-0.200***	-	-	-0.196***	-	-0.136**	-	-	-0.126*
				(0.058)			(0.058)		(0.066)			(0.065)
L.Adj. wage share	-	-	-	-	-0.134**	-0.138**	-0.130**	-	-	-0.153**	-0.157**	-0.144**
					(0.062)	(0.063)	(0.063)			(0.062)	(0.061)	(0.062)
Observations	447	447	447	447	447	447	447	447	447	447	447	447
Countries	18	18	18	18	18	18	18	18	18	18	18	18
R-squared	0.656	0.687	0.662	0.693	0.653	0.659	0.689	0.703	0.701	0.687	0.704	0.700
Rho	0.691	0.697	0.694	0.692	0.689	0.692	0.694	0.685	0.693	0.696	0.689	0.692

Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 3.A for a detailed description of the data.

variable is consistent with the VoC view that higher wage centralization contributes to an export-led model (Iversen and Soskice, 2010; Hope and Soskice, 2016).

In Columns 3-7 of Table 3.1, wage centralization is excluded from, and various measures of income distribution are included in the estimation. Columns 3 and 4 present the results for two models where different measures of personal income inequality were added to the baseline specification. While the Gini coefficient has a negative but not statistically significant effect on the current account (Column 3), the top 5% income share is highly significant. A 1 percentage point increase of the top 5% household income share (relative to trading partners) reduces the current account balance by 0.19 percentage points (Column 4). This result is consistent with the trickle-down consumption and expenditure cascades hypotheses, but is difficult to square with the simple Keynesian consumption function. Columns 5-7 of Table 3.1 show the estimation results for three different models that include a measure of the wage share, either separately or in combination with the Gini coefficient or the top 5% income share. Interestingly, a rise in the wage share is estimated to have the opposite effect of a fall in personal income inequality.[5] In our preferred specification (Column 7), the estimated coefficient on the top 5% income share remains rather stable compared to the regression in Column 4, and a 1 percentage point rise in the wage share (relative to trading partners) leads to a decrease of the current account of 0.12 percentage points. This latter effect is consistent with the notion of wage-led domestic growth.

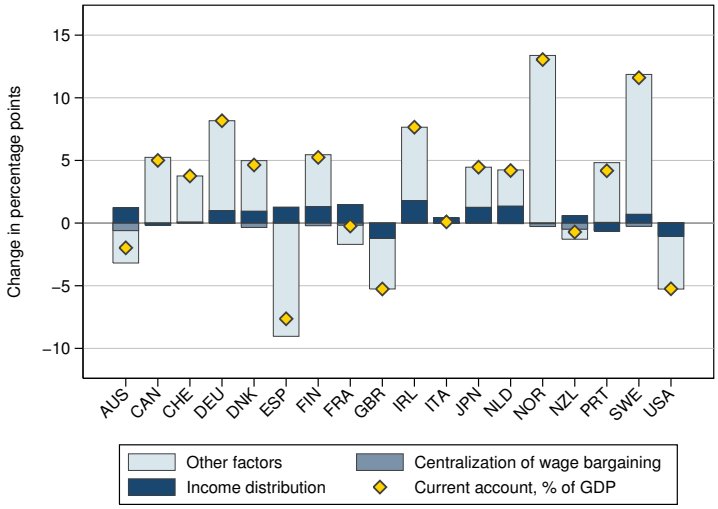
In Columns 8-12 of Table 3.1, wage centralization and the various income distribution variables, either separately or jointly, are included in the model. Interestingly, wage centralization ceases to be a statistically significant predictor of the current account when included together with the top household income share (Columns 9 and 12), whereas it remains statistically significant when included together with the Gini coefficient and/or the wage share (Columns 8, 10, 11). This finding suggests that at least part of the link between stronger wage coordination and a higher current account is due to the former being associated with lower top-end personal income inequality. In fact, the estimated coefficient on the top household income share is slightly smaller when wage centralization is added to the model (Columns 9 and 12) than when it is not (Columns 4 and 7). The estimated coefficient on the wage share, by contrast, remains virtually unchanged throughout all the different specifications.

In Table 3.2, we use the adjusted bargaining coverage rate from the Visser (2015) database as an alternative measure of wage coordination. The adjusted bargaining coverage rate is defined as employees covered by collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining, expressed as percentage, adjusted for the possibility that some sectors or occupations are

[5]The results are robust to using the manufacturing wage share as well as different measures of personal income inequality.

excluded from the right to bargain. The findings from Table 3.1 turn out to be largely robust to this different operationalization of wage coordination. Interestingly, bargaining coverage is a significant explanatory factor for the current account even when the income distribution variables are included in the model. However, the estimated coefficient on the bargaining coverage rate decreases when top income shares are controlled for.[6]

Figure 3.5: Contribution of change in distribution variables to change in current account balances



Notes: The figure shows the estimated contribution of the change in the centralization of wage bargaining and the income distribution to the change in the current account for the period 1981-2007. For Norway results are shown for the period 1981-2006. For New Zealand results are shown for the period 1987-2007. For Portugal results are shown for the period 1981-2006. For Spain results are shown for the period 1982-2007. For Switzerland results are shown for the period 1991-2007.

Figure 3.5 shows the estimated contributions of changes in income distribution and wage centralization to the changes of current account balances for the 18 countries of our sample for the period 1981-2007, based on the model from Column 12 in Table 3.1. As can be seen in the Figure, the contributions of changes in the wage share and top income shares are non-negligible for many countries. Taken together, changes in income distribution account for, respectively, -1.20 and -1.02 percentage points of the total change in the

[6]It is still possible that the estimated coefficients on the wage coordination variables reported in Tables 3.1 and 3.2 also capture the effect of other features of CMEs and LMEs on the current account. One obvious candidate would be financial market institutions and coordination in corporate governance (see Hall and Gingerich, 2009). Since indexes of financial and corporate governance institutions are not readily available for our sample, we defined "financial structure" as a continuous variable measuring the relative size of market-based finance over bank-based finance, following Phillips et al. (2013) and Tan et al. (2015). The variable is defined as the log ratio of stock market capitalization to bank loans issued to the private sector in a year. However, the variable turned out to be insignificant in almost all specifications, confirming the findings by Phillips et al. (2013). The effects of the centralization and bargaining coverage variables, respectively, were robust to including the financial structure variable. However, given the difficulty of proxying financial and corporate governance institutions, additional research in this direction is certainly necessary.

current account balances of, respectively, -5.26 and -5.24 percentage points for the United Kingdom and the United States, the two main current account deficit countries prior to the global financial crisis. For Germany and Japan, the two countries with the largest current account surpluses before the crisis, the respective numbers are +0.98 against +8.17 and +1.23 against +4.46 percentage points.

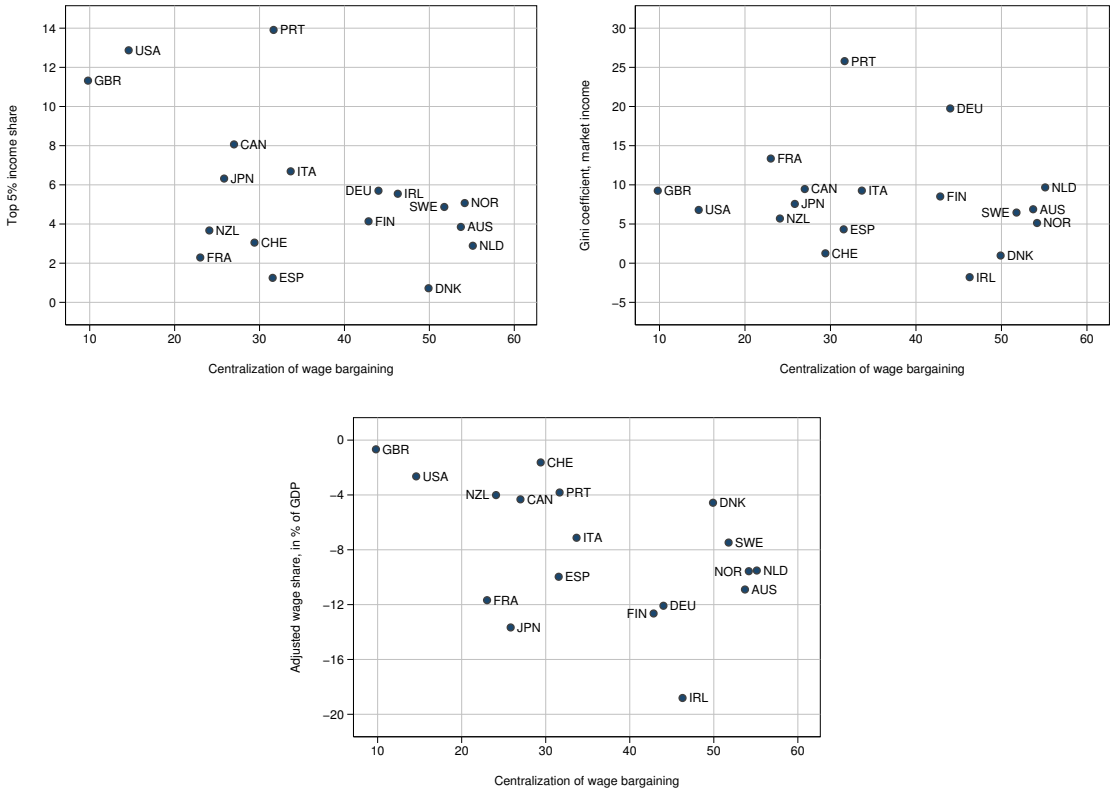
3.5 Determinants of income distribution

3.5.1 The role of wage coordination

According to our current account estimations, the role of wage coordination in the emergence of current account imbalances is less important than the effect of income distribution. Broadly speaking, this finding lends more support to the growth model perspective. However, differences in the degree of wage coordination may be linked to different patterns of income distribution in different countries. Indeed, Figure 3.6 suggests that countries with more coordinated wage bargaining systems have tended to produce smaller increases of top household income shares, but larger falls in wage shares. In both figures, the United States and the United Kingdom clearly stand out as the two countries with an especially pronounced increase in top household income shares and a rather limited fall in the wage share. By contrast, more coordinated economies have not fared any better in constraining the rise in the Gini coefficient of household market income.

We can interpret Figure 3.6 as *prima facie* evidence that trade unions in economies featuring centralized wage bargaining have managed to limit the rise in (top-end) income inequality. While this finding is in line with the broad theoretical argument by Iversen and Soskice (2010), it is interesting to note that the negative link between wage coordination and income inequality applies in particular to the top end of the income distribution. Clearly, even in CMEs top executive remuneration cannot be influenced directly by trade unions through wage coordination because such compensation schemes are not formally subject to collective bargaining agreements. Therefore, we hypothesize that wage coordination affects top income shares in an indirect way. Indeed, the subdued rise in top income shares provides some indication that unions have continued to exploit institutions and norms of coordination in a way as to achieve "wage solidarism" in the upper part of the distribution. As Hassel (2014), for example, argues with respect to recent developments in the German political economy, firms seek tighter cooperation with core workers in the face of tighter competitive pressures in a view to exploit institutional advantages of coordination. While this form of labor cooperation sharpened insider-outsider divisions and were built upon service sector cost cutting through liberalization, as argued by Hassel (2014), it is clearly incompatible with excessive earnings inequality at the very top of the distribution.

Figure 3.6: Income distribution and centralization of wage bargaining



Notes: The figure shows the average of the centralization of wage bargaining (horizontal axis) against the change in, respectively, the top 5% household income share, the Gini coefficient of household market income, and the adjusted wage share (vertical axis), 1981-2007. For New Zealand changes are shown for the period 1986-2007. For Portugal changes are shown for the period 1981-2005. For Switzerland changes are shown for the period 1991-2007. For all other countries, changes are calculated for the period 1981-2007.

It is also likely that cross-country differences in the degree of wage coordination are linked to other institutional differences, in particular in corporate governance and the structure of financial markets. Although indexes of coordination in corporate governance are not readily available for our sample, the vast literature on institutional complementarity suggests that countries with higher coordination in labor relations also tend to be characterized by a higher degree of coordination in corporate governance (Hall and Gingerich, 2009).

Moreover, to the extent that centralized wage bargaining systems are often complemented by proportional-representative electoral systems, which in turn are biased towards center-left coalitions (Iversen and Soskice, 2010), more coordinated economies are also more likely to tackle top-end personal income inequality through other means than the wage bargaining process, e.g., labor market regulations and tax policy.

The absence of a clear correlation of the Gini coefficient of household market income with wage coordination, apparent in Figure 3.6, suggests that the growth of income in-

equality over the entire distribution could not be restrained more in more coordinated economies. Hence, income inequality in many countries has strongly increased in the lower segments of the distribution, against the background of globalization, technological change and the zeitgeist of deregulation.

As for the negative link between wage centralization and the wage share in Figure 3.6, it can be interpreted largely as a reflection of the lower increases of top executive wages in the more coordinated economies. In addition, deliberate nominal wage restraint through coordinated wage bargaining can also bring about a fall in the wage share. One important channel is through pricing-to-market policies of exporting (and import-competing) firms. If the export (and domestic) price level reacts less than proportionally to changes in nominal unit labor costs, nominal wage restraint can increase both international price competitiveness and induce increasing profit margins and hence a fall in the wage share. While higher price competitiveness likely is perceived as a desired effect of wage moderation from the point of view of unions, the fall in the wage share can be seen either as a negative side-effect or as a reflection of the overall weakened bargaining power of unions.

In a nutshell, unions in countries with more strongly coordinated labor markets have managed to prevent rising top-end personal income inequality, but they accepted, or had to accept, the decline in the share of national income going to aggregate wages. On the other hand, countries with a lower degree of wage coordination developed winner-take-all labor markets which contributed to both the explosion of top-end personal income inequality and the stabilization of the wage share.

3.5.2 Regression analysis

Different strands in the literature have analyzed the determinants of income distribution from different angles. Most works have focused either on the functional or on the personal income distribution. In the mainstream macroeconomics literature, important contributions have been made by the research departments of the IMF and the OECD in the form of panel regression analyses for a wide range of countries over several decades. In this strand of the literature, there is a strong emphasis on skill-biased technological change as the main cause of rising personal income inequality, with trade and financial globalization being regarded as additional explanatory factors (e.g. Jaumotte et al., 2013). In recent works, the role of trade unions, labor market, tax policies and financial deregulation in affecting inequality have been highlighted more prominently than previously (Dabla-Norris et al., 2015; Jaumotte and Osorio-Buitron, 2015). Income inequality is typically measured by the Gini coefficient of household market income, but the recent study by Jaumotte and Osorio-Buitron (2015) also uses the top 10% household income share as the dependent variable in a regression analysis. Interestingly, analyses inquiring into

the determinants of the wage share typically consider a very similar set of potential explanatory factors as those concerned with personal income inequality (e.g. Jaumotte and Tytell, 2007; OECD, 2012; IMF, 2017*b*).

The comparative political economy and the economic sociology literature have laid a stronger focus on the political and institutional determinants of income distribution. As noted above, the comparative political economy literature has been mainly preoccupied with the personal distribution of income. For a long time, a widely accepted notion emanating from this literature was that trade unionism and centralized wage bargaining have an equalizing effect on earnings dispersion and income inequality (e.g. Wallerstein, 1999; Pontusson, 2013 for an overview). More recently, however, there is a growing consensus that especially since the 1990s cross-country differences in and within-country time-series evolutions of wage and income inequality are no longer as accurately explained by unionization and the level at which wages are bargained collectively as in previous periods. Quantitative evidence of this hypothesis is presented by Golden and Wallerstein (2011) and Pontusson (2013) for the p90/p10 wage differential, and by Baccaro (2011) for the Gini coefficient of household market income. Huber et al. (2017) analyze how political and institutional factors impact on top household income shares.

Only a few studies have looked at the functional distribution of income with a focus on political and institutional factors. Stockhammer (2017) highlights the importance of financialization and workers' bargaining power to the decline in the wage share. Kristal (2010) and Bengtsson (2014) conclude that the fall in the wage share in many countries has been the result of distributional struggle, with welfare state retrenchment and the decline of the unions playing important roles. Interestingly, Bengtsson (2014) finds that although overall there is a positive relationship between union density and the wage share, the relationship is weak or non-existent in the Nordic countries, perhaps owing to increased incentives of trade unions in corporatist countries for wage moderation policies in a context of increased global competition and conservative monetary policy.

We are not aware of any studies that have analyzed the determinants of the functional and the personal distribution in conjunction with each other for the same country sample and time period. Therefore, in the present chapter, we estimate the following three equations, using the same sample of 18 countries as in the current account regressions:

$$TIS_{i,t} = Z_{i,t}\Gamma + \beta_1 TECH_{i,t} + \beta_2 GLOB_{i,t} + \beta_3 FIN_{i,t} + \beta_4 UDEN_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3.2)$$

$$GINI_{i,t} = Z_{i,t}\Gamma + \beta_1 TECH_{i,t} + \beta_2 GLOB_{i,t} + \beta_3 FIN_{i,t} + \beta_4 UDEN_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3.3)$$

$$WS_{i,t} = Z_{i,t}\Gamma + \beta_1 TECH_{i,t} + \beta_2 GLOB_{i,t} + \beta_3 FIN_{i,t} + \beta_4 UDEN_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (3.4)$$

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$ denote the cross-sectional and time dimensions, respectively. The dependent variables are, respectively, the top 5% household income share, $TIS_{i,t}$, the Gini coefficient of household market income, $GINI_{i,t}$, and the wage share, $WS_{i,t}$. All three equations include a set of common explanatory factors that are frequently used in the literature on the determinants of both personal income inequality and the wage share. While this set of explanatory variables is standard in the empirical literature, our choice of proxy variables is inspired by Jaumotte and Osorio-Buitron (2015). They include: technology, $TECH_{i,t}$ (the share of information and communications technology (ICT) capital in the total capital stock), globalization, $GLOB_{i,t}$ (the share of China in world exports interacted with the country's lagged level of income per capita), financial reform, $FIN_{i,t}$ (using the financial reform index constructed by Abiad et al., 2008), union density, $UDEN_{i,t}$, and further control variables, $Z_{i,t}$ (the top marginal personal income tax rate, and the minimum wage expressed as percent of median wage).

In some specifications, we interact technological change, globalization, financial reform and union density with the degree of centralization of wage bargaining, $CENT_{i,t}$. The variable $CENT_{i,t}$ measures the deviation of the degree of wage centralization in a given country in a given year from the sample mean. As discussed above, we hypothesize that in countries with centralized wage bargaining, unions, faced with the challenges technological change and globalization, have strategically engaged in wage moderation policies while also trying to limit the rise in top-end personal income inequality. We experiment with different interaction terms, because it has proven difficult in previous studies to disentangle empirically and conceptually the respective effects of different explanatory variables on income distribution. For example, while union density can be seen as a direct measure of workers' bargaining power, the latter is also influenced by technological change, globalization and financial deregulation (IMF, 2017*b*). The model also includes country fixed effects, μ_i, and time fixed effects, λ_t. $\varepsilon_{i,t}$ is a residual error term with zero mean. Variable definitions and data sources are provided in Appendix 3.A. The equations are estimated by three-stage least squares (3SLS), a technique that improves the efficiency of the estimates by taking account of the correlation between the equations' residuals.

The results for Equations 3.2-3.4 are shown in Tables 3.3-3.5. As can be seen in Column 1 of Tables 3.3-3.5, the model without the centralization of wage bargaining variable performs overall quite well for the different distribution variables. According to the estimations, technological change and globalization have contributed to the rise in top household income shares and the Gini coefficient, and to the fall in the wage share. Moreover, additional explanatory factors for the rise in personal income inequality are financial deregulation, decreasing union density, lower top income tax rates and lower minimum wages. In Column 2 of Tables 3.3-3.5, we include centralization of wage bargaining as an additional explanatory variable. While the estimation for the Gini coefficient suggests

Table 3.3: Wage coordination and the top 5% household income share

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	*TIS*	*TIS*	*TIS*	*TIS*	*TIS*	*TIS*
Ln(ICT share in capital stock)	0.038**	0.037**	0.035**	0.045***	0.028*	0.029*
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Ln(L.Income per capita)	-0.200***	-0.202***	-0.216***	-0.151***	-0.206***	-0.219***
	(0.045)	(0.046)	(0.045)	(0.047)	(0.044)	(0.044)
Ln(L.income per capita) × China export share	0.063***	0.064***	0.068***	0.066***	0.065***	0.068***
	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
Ln(Financial reform index)	0.040**	0.040**	0.042**	0.040**	0.042**	0.049**
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Union density	-0.564***	-0.570***	-0.600***	-0.518***	-0.551***	-0.622***
	(0.074)	(0.079)	(0.074)	(0.074)	(0.073)	(0.075)
Top tax	-0.209***	-0.208***	-0.185***	-0.190***	-0.175***	-0.184***
	(0.056)	(0.057)	(0.057)	(0.056)	(0.057)	(0.056)
Minimum wage	-0.023	-0.023	-0.031	-0.044	0.007	-0.038
	(0.034)	(0.034)	(0.034)	(0.034)	(0.035)	(0.034)
Centralization of wage bargaining	-	0.012	-	-	-	-
		(0.065)				
Ln(ICT share in capital stock) × CENT	-	-	-0.034***	-	-	-
			(0.013)			
Ln(L.income per capita) × China export share × CENT	-	-	-	-0.004***	-	-
				(0.001)		
Ln(Financial reform index) × CENT	-	-	-	-	-0.229***	-
					(0.075)	
Union density × CENT	-	-	-	-	-	0.497***
						(0.145)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	469	469	469	469	469	469
Countries	18	18	18	18	18	18

Notes: TIS is the top 5% household income share. All regressions are estimates by three-stage least squares (3SLS) and include country and time fixed effects. Standard errors are reported in parentheses. All estimations include a constant term. Ln denotes the natural logarithm and L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 3.A for a detailed description of the data.

Table 3.4: Wage coordination and the Gini coefficient of household market income

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	*GINI*	*GINI*	*GINI*	*GINI*	*GINI*	*GINI*
Ln(ICT share in capital stock)	0.088***	0.095***	0.089***	0.091***	0.079***	0.092***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Ln(L.Income per capita)	-0.311***	-0.273***	-0.305***	-0.286***	-0.316***	-0.301***
	(0.038)	(0.039)	(0.039)	(0.041)	(0.038)	(0.039)
Ln(L.income per capita) × China export share	0.036***	0.031***	0.034***	0.038***	0.038***	0.034***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Ln(Financial reform index)	0.065***	0.060***	0.064***	0.065***	0.067***	0.060***
	(0.017)	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)
Union density	-0.245***	-0.142**	-0.231***	-0.222***	-0.234***	-0.215***
	(0.064)	(0.067)	(0.065)	(0.065)	(0.063)	(0.065)
Top tax	-0.192***	-0.208***	-0.202***	-0.183***	-0.164***	-0.205***
	(0.049)	(0.048)	(0.049)	(0.049)	(0.049)	(0.049)
Minimum wage	-0.175***	-0.164***	-0.172***	-0.186***	-0.151***	-0.167***
	(0.030)	(0.029)	(0.030)	(0.030)	(0.030)	(0.030)
Centralization of wage bargaining	-	-0.231***	-	-	-	-
		(0.055)				
Ln(ICT share in capital stock) × CENT	-	-	0.013	-	-	-
			(0.011)			
Ln(L.income per capita) × China export share × CENT	-	-	-	-0.002*	-	-
				(0.001)		
Ln(Financial reform index) × CENT	-	-	-	-	-0.192***	-
					(0.065)	
Union density × CENT	-	-	-	-	-	-0.259**
						(0.126)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	469	469	469	469	469	469
Countries	18	18	18	18	18	18

Notes: GINI is the Gini coefficient of household market income. All regressions are estimates by three-stage least squares (3SLS) and include country and time fixed effects. Standard errors are reported in parentheses. All estimations include a constant term. Ln denotes the natural logarithm and L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 3.A for a detailed description of the data.

Table 3.5: Wage coordination and the adjusted wage share

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	*WS*	*WS*	*WS*	*WS*	*WS*	*WS*
Ln(ICT share in capital stock)	-0.022**	-0.023***	-0.024***	-0.015*	-0.025***	-0.025***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)
Ln(L.Income per capita)	-0.084***	-0.088***	-0.094***	-0.033	-0.086***	-0.092***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.025)	(0.026)
Ln(L.income per capita) × China export share	-0.019***	-0.018***	-0.016***	-0.016***	-0.018***	-0.017***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Ln(Financial reform index)	0.008	0.008	0.009	0.008	0.009	0.011
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Union density	-0.026	-0.037	-0.048	0.022	-0.022	-0.047
	(0.042)	(0.045)	(0.043)	(0.042)	(0.042)	(0.043)
Top tax	-0.045	-0.043	-0.030	-0.025	-0.034	-0.036
	(0.032)	(0.032)	(0.032)	(0.031)	(0.033)	(0.032)
Minimum wage	-0.053***	-0.055***	-0.058***	-0.076***	-0.044**	-0.059***
	(0.020)	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)
Centralization of wage bargaining	-	0.025	-	-	-	-
		(0.037)				
Ln(ICT share in capital stock) × CENT	-	-	-0.021***	-	-	-
			(0.007)			
Ln(L.income per capita) × China export share × CENT	-	-	-	-0.004***	-	-
				(0.001)		
Ln(Financial reform index) × CENT	-	-	-	-	-0.076*	-
					(0.043)	
Union density × CENT	-	-	-	-	-	0.184**
						(0.084)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	469	469	469	469	469	469
Countries	18	18	18	18	18	18

Notes: WS is the adjusted wage share in % of GDP. All regressions are estimates by three-stage least squares (3SLS) and include country and time fixed effects. Standard errors are reported in parentheses. All estimations include a constant term. Ln denotes the natural logarithm and L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 3.A for a detailed description of the data.

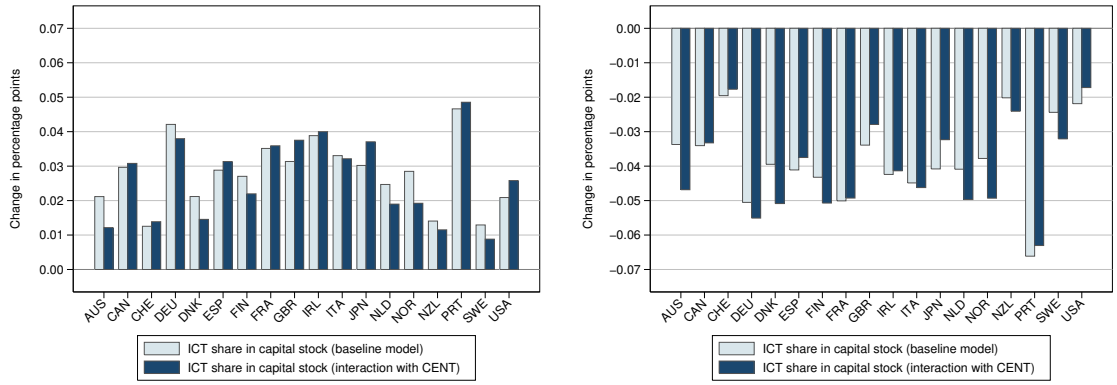
that a higher degree of wage centralization is correlated with lower personal income inequality in the broad sense, the centralization variable is insignificant in the estimations for the top 5% household income share and the wage share. These findings are not inconsistent with the argument developed above. Countries with differing degrees of wage coordination, which do not display strong time-series variation for individual countries, were all faced with similar global trends (technological change, globalization, financial liberalization and de-unionization) that have adversely affected the bargaining power of the lower and middle classes since the 1980s. The more coordinated countries tended to experience weaker increases in top-end personal income inequality but more pronounced falls in the wage share. The more liberal countries, by contrast, showed stronger increases in top household income shares but smaller declines in the wage share (see Figure 3.6).

In fact, adding interaction terms to the regressions yields qualitatively interesting results, tentatively confirming our conjectures based on the descriptive analysis presented in Section 3.3. The degree of centralization of wage bargaining interacts negatively with technological change, globalization and financial reform, and positively with union density in the regressions for both personal income inequality (Tables 3.3 and 3.4) and the wage share (Table 3.5). In other words, in countries with relatively strong wage coordination personal income inequality has increased less than in countries with more liberal labor markets, even when faced in similar ways with the challenges of technological change, globalization, financial reform and de-unionization. On the other hand, the share of wages in national income fell more strongly in countries with more coordinated labor markets.[7] Based on our estimation results, we thus cannot attribute changes in top-end personal income inequality and in the wage share to changes in national wage bargaining institutions in the time series dimension, but we find that the degree of wage centralization modifies the impact of other factors that have been found to affect income distribution in the literature.

As an illustration of the modifying role of wage centralization, Figure 3.7 shows the estimated contributions of technological change on the top 5% household income share and the wage share for the 18 countries of our sample for the period 1981-2007, based on the models from Columns 1 and 3 in Tables 3.3 and 3.5. As the Figure shows, in countries with a relatively high degree of wage bargaining coordination (e.g. Germany, Denmark, Netherlands, Norway, Sweden), the estimated impact of technological change on the top 5% income share is lower when technology is interacted with wage centralization. By contrast, allowing for the interaction with wage centralization increases the negative impact of wage centralization on the wage share. The opposite effects are found

[7] We have run a jackknife analysis which suggests the results are overall robust to removing individual countries from the sample. Interestingly, however, the interaction effects get less significant when excluding the main LMEs (United Kingdom, United States) from the sample, whereas they are very robust to exclusion of the main CMEs (Germany, Japan).

Figure 3.7: Contribution of change in ICT share in capital stock (in interaction with centralization of wage bargaining) to change in income distribution



Notes: The figure shows the estimated contribution of the change in the ICT share in capital stock to the change in, respectively, the top 5% household income share and the adjusted wage share for the period 1981-2007.

for countries with a relatively low degree of wage centralization, in particular Portugal, the United Kingdom, and the United States.[8]

While we believe that our estimation results are qualitatively interesting and in line with the argument developed above, a few words of caution are nevertheless in order. Firstly, as argued in Subsection 3.5.1, it is possible that the wage centralization variable does not actually capture the effects of wage bargaining institutions but of other institutions that are correlated with the centralization of wage bargaining but for which appropriate proxy variables are unavailable. Secondly, as has been recognized in the existing literature, it is extremely difficult to quantify the distinct effects of different drivers of income distribution. To a large extent, treating technological change, globalization, financial reform and de-unionization as distinct channels is an artificial separation, as they are all potentially intertwined (IMF, 2017*b*, p. 8). For example, financial reform and declining unionization may reflect the decline of labor's bargaining power, itself a result of trade integration (Elsby et al., 2013). Similarly, technological change and global integration tend to be mutually reinforcing forces (IMF, 2017*b*). In sum, we are certainly less confident about the exact interpretation of the income distribution estimations in the present Section, compared with the current account estimations discussed in Section 3.4.

3.6 Discussion

By way of conclusion, in what follows we briefly discuss our findings against the background of previous, related literature. To begin with, the growth model perspective as

[8]To save space and for the reasons explained in the next paragraph, we do not show the contributions of the other explanatory variables interacting with wage centralization. The results are available upon request.

proposed by Baccaro and Pontusson (2016) rightly emphasizes the importance of income distribution for macroeconomic outcomes and that adverse distributional shocks in many countries put an end to the wage-led growth model of the Fordist period. They explicitly integrate the neo-Kaleckian concept of wage-led growth, which focuses on the aggregate demand effects of changes in the functional distribution of income (aggregate wages versus aggregate profits). But they do not explain why different countries developed different growth models since the end of the post-Fordist period. We show how different growth regimes are linked to different patterns of (functional and personal) income distribution, and how differences in wage bargaining institutions contribute to explaining these different patterns of income distribution, in spite of most countries confronting similar paths of technological change and globalization as well as financial and labor market liberalization.

Our analysis also relates directly to the VoC literature by addressing the question why different sets of countries, *i.e.*, LMEs and CMEs, developed different growth models. However, we have argued in this chapter that the macroeconomic effects of wage centralization (or, more broadly speaking, coordination) may work through different channels than those highlighted in the VoC literature. While the VoC literature emphasizes that wage restraint can be more easily organized in countries with coordinated labor market, the channel through which wage centralization affects aggregate demand and the trade balance is not income distribution but export price competitiveness and conservative monetary and fiscal policies. For instance, Höpner and Lutter (2014) show that wage centralization is related negatively with nominal unit labor cost growth. Moreover, Iversen and Soskice (2012) refer to a number of studies suggesting that stronger wage centralization is associated with more conservative monetary and fiscal policies. While our results are not inconsistent with these hypotheses in theory, we find that the degree of wage coordination played only a small direct role in the emergence of current account imbalances, when the effect of income distribution is accounted for. However, we find some tentative empirical evidence that wage bargaining coordination (and other forms of coordination correlating with wage centralization) indirectly affects the patterns of income distribution (functional and personal) in different countries.

Two important avenues for future research are highlighted by Baccaro and Pontusson (2016). Firstly, how do national growth models evolve over time? To the extent that both the debt-led growth models of the United States and the United Kingdom and the export-led growth models of Germany and Japan have proven unsustainable with the global financial crisis, an intriguing question to ask is what will be the new drivers of aggregate demand in the post-crisis period? Can aggregate demand recover sustainably over the medium to long term without there being a reversal of the adverse distributional shifts of the past three or four decades? Whereas the VoC literature initially highlighted the institutional coherence and efficiency of CMEs and LMEs, it is now obvious that both

types of capitalism contributed to the instability of the international economic system as a whole. Secondly, and related to the first point, how can politics be introduced more explicitly into the analysis of the determinants and macroeconomic consequences of income distribution? While we highlight the importance of wage centralization and the distinction of personal and functional income distribution for the emergence of different growth models, the latter should also be analyzed within the context of broader institutional factors and political power relations (see Belabed et al., 2017; Behringer and van Treeck, 2019*b*). In particular, different institutions in the areas of social security, education, housing and corporate governance likely play an important role in explaining why adverse distributional shifts have had different effects on household, corporate, and government spending patterns in particular countries.

Appendix to Chapter 3

3.A Description of data

3.A.1 Income distribution

Top income shares: We use top 5% income share series from the World Top Incomes Database (WTID) as a proxy for income inequality. These data are collected from personal income tax returns following the methodology outlined in Piketty (2003) and Piketty and Saez (2003). Income reported is typically gross total income and includes labor, business and capital income (and in a few cases also realized capital gains). For Ireland, data on top 5% income shares are not available. We therefore use the mean of the top 1% income share and the top 10% income share.

Gini coefficient: As an alternative measure of income inequality we use the Gini coefficient of equivalized household market income (*i.e.* before taxes and transfers) of the Standardized Income Inequality Database (SWIID, version 4.0). For a detailed description of the dataset, see Solt (2009).

Wage share: We use the adjusted wage share of the total economy to proxy the functional income distribution. The adjusted wage share of the total economy is defined as compensation per employees as a percentage of nominal GDP at current factor cost per person employed. Data are taken from the AMECO database (February 2017 version) of the European Commission.

3.A.2 Wage coordination

Centralization of wage bargaining: The centralization of wage bargaining is a summary measure, taking into account both union authority and union concentration at multiple levels. The construction of the index follows the methodology proposed by Iversen (1999). Data are taken from the Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS Database, version 5.0) provided by Visser (2015).

Adjusted bargaining coverage rate: The adjusted bargaining coverage rate is defined as the number of employees covered by collective (wage) bargaining agreements as a proportion of all wage and salary workers in employment with the right to bargaining, adjusted for the possibility that some sectors or occupations are excluded from the right to bargain. Data are taken from the Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS Database, version

5.0) provided by Visser (2015).

3.A.3 Determinants of macroeconomic imbalances

Current account balance: The current account balance is defined as the sum of net exports of goods and services, net primary income, and net secondary income, in percent of GDP. Data for the current account balance are taken from the World Development Indicators (WDI) database (December 2012 version) provided by the World Bank.

Net foreign assets: Net foreign assets are measured as total assets minus total liabilities in percent of GDP. In order to capture possible nonlinearities in the relationship between the current account and the net foreign asset position, we include an interaction term to allow for a different slope when the net foreign asset position is below negative 60 percent of GDP. Data are taken from the updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2007).

Output per worker, relative to top 3 economies: To measure a country's relative stage of economic development, we take the ratio of PPP converted GDP to working age population relative to the average productivity of three large economies (Germany, Japan, and the United States). We use real GDP at chained PPPs in constant 2005 U.S. Dollars from the Penn World Table (PWT, version 8.0) provided by Feenstra et al. (2015). Data on working age population are taken from the World Development Indicators (WDI) database (December 2014 version). Relative output per worker is also interacted with an indicator for capital account openness. The degree of a country's capital account openness is measured by the capital controls index developed by Quinn (1997) and Quinn and Toyoda (2008). This index measures the magnitude of capital account liberalization and is scaled between 0 (no capital controls) and 1 (full capital controls).

Demographics: Demographic developments are proxied by the old-age dependency ratio, which is constructed as the ratio of the population older than 65 years to the population between 14 and 65, and population growth. Data are taken from the World Development Indicators (WDI) database (December 2014 version).

Reserve currency status: We use the share of a country's own currency in the total stock of world reserves as a proxy for the so-called "exorbitant privilege" of reserve currency countries. Data are taken from the External Balance Assessment (EBA) methodology developed by Phillips et al. (2013). For the period 1981-1985 we use the latest available country-specific observation which is provided by the EBA dataset.

Output gap: The output gap is measured by the Hodrick-Prescott filter. This procedure removes the cyclical component from the long-term trend GDP. The HP filtered estimates of the output gap are based on data over the period 1970-2011. Data are in constant 2005 U.S. Dollars and taken from the Penn World Table (PWT, version 8.0).

Terms of trade gap: The terms of trade are defined as the ratio between the index of export prices and the index of import prices. The terms of trade gap is measured by the Hodrick-Prescott filter based on data over the period 1970-2014. We employ data from the OECD National Accounts Statistics database. The resulting terms of trade gap series is then interacted with an indicator of a country's trade openness. Trade openness is measured as the sum of exports and imports of goods and services in percent of GDP. Data are taken from the World Development Indicators (WDI) database (December 2014 version).

Private credit: We use private credit by deposit money banks and other financial institutions in percent of GDP as a proxy for both "financial excesses" and financial development. The variable measures the deviation from a country's current level of credit provided to households and non-financial corporations from its own historical average. Data are taken from the Global Financial Development Database (GFDD) provided by the World Bank (November 2013 version). For Germany and the United Kingdom, data on private credit by deposit money banks and other financial institutions are only available since 1992 and 1889, respectively. For these countries, we therefore complement the series with data on domestic credit provided to the private sector, also taken from the GFDD.

Fiscal balance: The fiscal balance is defined as total general government revenue minus total general government expenditures in percent of GDP. We employ several sources for the fiscal balance. Our primary source is the Economic Outlook database (No. 96, November 2014) from the OECD. As the AMECO database of the European Commission and the World Economic Outlook (WEO) database from the IMF provide longer series for several countries, we complement the OECD series with data from these alternative sources. For France and Germany, we use series from the AMECO database. For Australia and Ireland, we employ data from the WEO database.

3.A.4 Determinants of income distribution

ICT share in capital stock: We use the share of information and communications technology (ICT) capital in the total capital stock as a proxy for technological progress. ICT consists of different components such as information technology equipment (computers

and related hardware), communications equipment, and software. Data on the capital stock share of ICT are taken from Jaumotte and Osorio-Buitron (2015).

Income per capita: Income per capita is constructed as the ratio of PPP converted GDP to total population. We use real GDP at chained PPPs in constant 2011 U.S. Dollars from the Penn World Table (PWT, version 9.0) provided by Feenstra et al. (2015). Data on total population are also taken from the Penn World Table (PWT, version 9.0).

China export share: As a proxy for globalization we use the share of China in world exports which is interacted with a country's initial level of income per capita. The share of China in world exports is measured as the ratio of China's exports of goods and services to world exports of goods and services. Data are taken from the World Development Indicators (WDI) database (March 2017 version).

Financial reform: We use the financial reform index as a proxy for financial deregulation. Data are taken from the "Financial Reform Database" developed by Abiad et al. (2008). The database records financial policy changes along different dimension (credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets, banking regulations, and restrictions on the capital account), which are then combined in an aggregate index. The financial reform index is available through 2005. For the years 2006-2007, we use the latest available country-specific observation.

Union density: Trade union density is defined as the ratio of wage and salary earners that are trade union members, divided by the total number of wage and salary earners. Data are taken from the OECD Employment and Labour Market Statistics database (March 2017 version). Density is calculated using survey data, wherever possible, and administrative data adjusted for non-active and self-employed members otherwise.

Top income tax rate: We use top marginal income tax rates to measure the effects of taxation. The marginal statutory rates are expressed as a percentage of taxable income and exclusive of surtax (if any). Sub-central taxes are not included. Data are taken from the OECD Tax database (March 2017 version). For the period 1981-1999 we use data from the historical "Personal income tax rates and thresholds for central government - Table I.1" provided by the OECD.

Minimum wage: We use the minimum wage as a proxy for changes in labor market institutions. The minimum wage is measured as the ratio of minimum wages to median earnings of full-time employees. Data are taken from the OECD Employment and Labour Market Statistics database (March 2017 version).

3.B Demeaning of explanatory variables in Section 3.4.2

Since national current account balances are influenced by both domestic and foreign economic conditions, most explanatory variables are converted into deviations from a weighted sample mean. The sample mean is calculated across all countries for which data are available for a given time period. Country-specific weighted averages of foreign variables are then constructed as follows:

$$\widetilde{X}_{i,t} = X_{i,t} - \frac{\sum_{i=1}^{J} (W_{i,t} \cdot X_{i,t})}{\sum_{i=1}^{J} W_{i,t}} \tag{3.5}$$

where $X_{i,t}$ denotes the observation of the respective explanatory variable for country i and time period t, and $W_{i,t}$ stands for the weighting variable. For country-specific GDP weights we use data from the Penn World Table (PWT, version 8.0) provided by Feenstra et al. (2015). Demeaning is not necessary for a few variables because it is already implicit in their definition (net foreign assets, terms of trade, own currency's share in world reserves).

Chapter 4

The corporate sector and the current account[1]

4.1 Introduction

In this chapter, we analyze how changes in corporate sector behavior affect national current account balances. While the global rise of corporate saving recently has received growing attention (Chen et al., 2017), it also has been noted that a number of countries with persistent current account surpluses, such as Germany, Japan, the Netherlands, or South Korea, are characterized by high and rising corporate financial surpluses. By contrast, major current account deficit countries, such as the United States or the United Kingdom, feature no, or less pronounced, secular upward trends in corporate net lending (IMF, 2017*a*).

At the theoretical level, the standard model of intertemporally optimizing households with rational expectations predicts that the saving behavior of the non-household sectors, *i.e.*, the government and the private corporate sector, has no influece on total saving and on the current account (Obstfeld and Rogoff, 1995). In particular, to the extent that households own domestic corporations, household saving behavior should offset changes in corporate saving. However, a rise (fall) in corporate saving leads to a higher (lower) current account if private households fail to see through the "corporate veil", *i.e.*, if higher (lower) corporate saving is not fully offset by lower (higher) household saving. This mechanism is conceptually similar to non-Ricardian saving behavior by households, which implies that a rise (fall) in government saving leads to a rise (fall) in aggregate saving, and hence the current account, because households fail to adjust personal savings downwards (upwards).

In standard panel estimations of current account determinants, based on the intertemporal maximization problem of the representative household in the tradition of Obstfeld and Rogoff (1995), the issue of non-household sector saving is dealt with in an asymmetric fashion. On the one hand, most current account estimations routinely test for non-Ricardian effects by introducing the fiscal balance as an explanatory variable. A robust finding is that the fiscal balance is positively linked with the current account, which

[1]This chapter is based on joint work with Till van Treeck. An earlier version of this chapter was published as "The corporate sector and the current account", FMM Working Paper 43-2019, see Behringer and van Treeck (2019*b*).

is interpreted as evidence that households do not fully offset changes in government saving (e.g. Abbas et al., 2011; Bluedorn and Leigh, 2011; Kumhof and Laxton, 2013; Phillips et al., 2013). By contrast, the potential current account effects linked to incomplete piercing of the corporate veil have not been systematically addressed in the existing literature. This is all the more surprising since, in an accounting sense, the main difference between current account surplus and current account deficit countries in the recent past has been that the corporate financial balance has displayed a rising trend in the surplus countries but not in the deficit countries (reflecting primarily differences in corporate saving). By contrast, household financial balances (and household saving) differ less between surplus and deficit countries (see IMF, 2017*a*).

The contribution of the present chapter is to analyze the current account effects of corporate sector behavior for a sample of 25, mainly industrialized, countries for the period 1980-2015. One important challenge is to disentangle the channels through which the corporate sector financial balance may affect the current account balance. At an accounting level, cross-country differences in corporate saving play a larger and more persistent role for current account balances than investment differentials. Including corporate sector saving in current account estimations also provides the most direct test of the corporate veil. However, we also assess the rationale for including corporate investment in addition to the standard control variables in our current account estimations, as discussed by Ca' Zorzi et al. (2012). Moreover, we consider the possibility that the current account effects of the corporate financial balance are due to international investment positions linked to foreign direct investment (FDI) activities, as suggested by Avdjiev et al. (2018). On the one hand, FDI flows may account for deviations of domestic business investment from its desired level for given values of the fundamental variables included in the current account estimation. On the other hand, differences in the accounting treatment of income derived from cross-border direct investment and portfolio investment activities may distort measures of national income, saving, and the current account (Fischer et al., 2019). Another question that we address is to what extent the contribution of corporate net lending to current account imbalances is a temporary phenomenon that is related to the global financial crisis starting in 2007, which may have affected corporations' and households' precautionary savings motives. IMF (2017*a*) tentatively suggests that the corporate veil thickened as a result of the crisis, noting that the time-series and cross-country correlation between corporate and household saving turned positive for the period 2009-2015. Similarly, Gruber and Kamin (2016) discuss the possibility of a structural break in corporate saving behavior caused by the global financial crisis. Finally, we ask whether the current account effects of corporate saving may be associated with changes in income inequality, a possibility discussed by Kumhof et al. (2012) and Dao and Maggi (2018). Rather than reflecting incomplete piercing of the corporate veil, a positive correlation between corporate saving and national saving may actually be due to differential saving

propensities of higher-income and lower-income households. Since the former own a disproportionate share of corporate wealth, higher corporate saving may be explained through a (financial) wealth term in shareholders' utility function. In other words, shareholders may have decided, against the backdrop of higher income inequality, to keep a higher share of their rising incomes as savings within firms. Consistent with this explanation, Dao and Maggi (2018) and IMF (2018) hypothesize that higher corporate saving may reinforce the aggregate demand and current account effects stemming from rising personal income and wealth inequality.

Our main findings are as follows. Firstly, we find significant effects of changes in the corporate sector variables (the corporate financial balance or corporate saving and investment separately) on the current account balance, which are of the same order of magnitude as the effect of a change in the government financial balance, controlling for other determinants of the current account. The current account effects of corporate saving are robust throughout our various specifications, whereas the effects of corporate investment are sensitive to the inclusion of high-investment Asian countries. Accounting for cross-country and time-series variations in corporate sector financial balances contributes sizably to understanding national current account balances. Secondly, the effects of corporate saving and investment persist when FDI activities are controlled for. Thirdly, we do not find evidence that the corporate veil thickened as a result of the global financial crisis starting in 2007. Since the wake of the crisis, the cross-country pattern of corporate net lending has changed somewhat, but it continues to affect national current account balances. Finally, the effects of corporate saving on the current account are unlikely to be merely the reflection of demand effects arising from changes in personal income inequality, since the effect of a rise in top household income shares on the current account balance points in the opposite direction of a rise in corporate saving.

The remainder of this chapter is structured as follows. In Section 4.2, we review the theoretical and empirical literature relating to the macroeconomic effects of corporate sector behavior and its implications for the current account. Section 4.3 discusses important stylized facts about sectoral financial balances and the current account in some selected large economies with a focus on trends in corporate saving and investment. Section 4.4 presents the empirical analysis. Section 4.5 concludes.

4.2 Literature review

The contribution of this chapter is to analyze the macroeconomic implications of corporate sector behavior within a panel estimation analysis of current account positions. It builds on three strands in the literature. Firstly, our work is related to a large body of studies that analyze current account determinants but do not address the role of the

corporate sector in a rigorous fashion. Secondly, there is an emerging literature, based on sector-level and firm-level data, documenting the trend towards rising corporate net lending positions across countries in recent decades. A third strand in the literature has developed formal tests of the corporate veil, albeit not in relation to current account balances.

4.2.1 Current account determinants

In face of the widening of current account imbalances especially since the 1990s and prior to the global financial crisis starting in 2007, a number of competing hypotheses have been put forward. These include the twin deficit hypothesis that current accounts are driven by government deficits (Abbas et al., 2011; Bluedorn and Leigh, 2011; Kumhof and Laxton, 2013); the savings-glut hypothesis that high savings in emerging markets are responsible for their current account surpluses (Chinn and Ito, 2007); the demographic hypothesis that population structure and life-cycle savings dynamics have contributed to current account imbalances (Cooper, 2008; Dao and Jones, 2018); the asset bubble explanation that wealth effects are the main force behind saving-investment imbalances (Fratzscher and Straub, 2009); the financial-development argument that countries with deeper financial markets attract foreign saving flows resulting in current account deficits (Gruber and Kamin, 2007; Caballero et al., 2008); the structural policy hypothesis that product and labor market regulations are important drivers of current accounts (Kerdrain et al., 2010); and the income distribution hypothesis that the relative stagnation of middle class incomes has contributed to either aggregate demand deficiency and current account surpluses or debt-financed consumption and current account deficits in different countries (Kumhof et al., 2012; Behringer and van Treeck, 2018). However, there is as of yet no consensus as to the relative importance of various factors in explaining the emergence and evolution of global imbalances. Chinn et al. (2011, p. 18) suggest the possibility of missing variables in existing estimation models.

The aforementioned hypotheses essentially focus on the household sector as the driving force behind national current account balances, in line with the underlying theoretical framework proposed by Obstfeld and Rogoff (1995). The role of the corporate sector has not been systematically addressed in the literature.[2] Our analysis of the current account effects of corporate sector saving and investment is, however, conceptually related to two of the aforementioned hypotheses, namely, the twin deficit hypothesis and the income distribution hypothesis. In the existing literature the government financial balance is routinely included in current account panel regression analyses and it is systematically found to be quantitatively important. According to existing estimates, a 1

[2]Exceptions are Bacchetta and Benhima (2015) and Fan and Kalemli-Özcan (2016), with a focus on corporate saving in emerging economies.

percentage point increase (decrease) in the fiscal balance leads to an increase (decrease) in the current account of between 0.2 and 0.5 percentage points (Lee et al., 2008; Phillips et al., 2013). The standard explanation of this finding refers to non-Ricardian behavior by households, *i.e.*, households do not fully incorporate government saving into personal saving decisions. Although corporate saving (the corporate financial balance) together with government saving (the fiscal balance) constitute the non-household part of domestic saving (the current account balance), corporate saving or the corporate financial balance have not been among the standard explanatory variables in the existing literature on the determinants of current account balances. Moreover, a number of recent works have pointed at a negative link between (top-end) income inequality and national current account balances (Kumhof et al., 2012; Behringer and van Treeck, 2018). To the extent that a rise in corporate saving as a percent of GDP implies a more unequal income distribution (e.g. when it is assumed that corporate retained earnings accrue proportionally to equity wealth, as suggested by Piketty et al., 2018), one may ask whether changes in corporate saving and personal income inequality have similar macroeconomic effects in terms of current account balances (see also Dao and Maggi, 2018).

4.2.2 Recent changes in corporate behavior

Although the trend towards higher corporate net lending in some countries has been discussed in policy circles for some while (e.g. IMF, 2006; André et al., 2007), the academic literature has been relatively silent on the macroeconomic implications of corporate sector saving and investment. The lack of attention to corporate net lending as a potential driver of macroeconomic trends has been noted in recent literature (Gruber and Kamin, 2016; IMF, 2017*a*; Dao and Maggi, 2018).

Chen et al. (2017) document the global rise in corporate saving using both national accounts and firm-level data. They show that, while the sectoral composition of global investment has remained largely stable over time, the sectoral composition of global saving has undergone substantial changes since 1980. In particular, saving by corporations has increased by nearly 5 percentage points relative to GDP whereas saving by households has decreased by nearly 6 percentage points (whereas government saving has not exhibited secular trends relative to GDP). While Chen et al. (2017) show, based on a general equilibrium model, that changes including declines in the real interest rate, the price of investment goods, corporate income taxes and increases in markups may explain the global rise in corporate saving, their descriptive analysis of national accounts data reveals sizable cross-country differences in the trends of corporate saving over time. Although Chen et al. (2017) emphasize the fact that corporate saving has increased in all ten of the world's largest economies, the rise in the corporate saving rate (corporate saving as a percentage of corporate value added) has been more than four times larger in such countries

as China, Japan, and South Korea than in the United Kingdom and the United States. It has also been considerably larger in France and Germany than in the United Kingdom and the United States. However, Chen et al. (2017) do not inquire into the implications of such cross-country differences in corporate saving for current account developments.

A detailed descriptive analysis of trends in corporate sector behavior with a view to connecting with the macro literature is provided by Dao and Maggi (2018), who employ both cross-country national accounts and firm-level data. While confirming the finding by Chen et al. (2017) that the increase in corporate excess saving is a robust feature across major economies, Dao and Maggi (2018) note that the rise in corporate saving and net lending clearly has been most pronounced in countries with persistent current account surpluses. They find that the trend towards higher corporate saving is driven by rising profitability, lower financing costs, and reduced tax rates and they analyze the motives for corporations' increased cash holding at the expense of other uses of corporate saving including fixed capital investment. Although Dao and Maggi (2018) emphasize the potentially sizable implications for current accounts across countries, they do not formally test for such effects.

Gruber and Kamin (2016) focus on corporate sector behavior in the aftermath of the global financial crisis that started in 2007. They demonstrate that levels of corporate net lending rose significantly in most OECD economies after the crisis and ask whether this recent upward trend constitutes a break with the past in corporate sector behavior. However, they conclude from their empirical analysis that the sharp declines in corporate investment after the crisis were generally consistent with past responses of investment to movements in fundamentals. In particular, they find little evidence that firms were reducing investment to strengthen their balance sheets, as payments to shareholders remained strong and were uncorrelated with investment. They conclude, therefore, that the increase in corporate net lending since the crisis must either be due to a crisis-induced structural break in corporate saving behavior, as corporate investment behaved largely as might be expected given the persistent weakness in growth, or due to endogenous responses of both investment and saving behavior to the global financial crisis. The analysis by Gruber and Kamin (2016) only superficially touches upon the question of whether cross-country differences in corporate saving and investment may contribute to current account (im)balances. In their descriptive analysis, they show that countries where corporate net lending increased relatively strongly between 2002-2008 and 2009-2015 experienced a relatively larger increase in the current account balance. However, Gruber and Kamin (2016) do not systematically examine cross-country differences in corporate saving and investment and their implications for current account balances either before or after the global financial crisis.

4.2.3 The corporate veil

Even although the potential importance of the corporate veil is generally recognized at the conceptual level (Atkinson, 2009), there are surprisingly few empirical analyses of the macroeconomic effects of corporate saving behavior.

It may be useful to begin the following discussion with a definition of the corporate veil. A corporate veil would exist if a shift in the distribution of an individual's wealth among corporate and non-corporate forms, holding her overall wealth constant, affected that individual's consumption (Auerbach and Hassett, 1991). In line with this definition, the following general consumption function can be used to design a formal test of the corporate veil (see Poterba, 1991):

$$C = \alpha_0 + \alpha_1 HW + \alpha_2 NHW + \alpha_3 DIV + \varepsilon \tag{4.1}$$

where household consumption, C, is a function of human wealth, HW, non-human wealth, NHW, and dividends, DIV. If households pierce the corporate veil and dividends convey no information about future corporate profits that is not also reflected in share values, then α_3 should be zero. Suppose a corporation decides to increase its saving, that is, to retain earnings rather than distribute them as dividends. Any sophisticated shareholder should understand that their net worth has increased and reduce their savings correspondingly in order to re-establish their optimal life-cycle consumption. By contrast, if households fail to fully see through the corporate veil, total national saving is affected by corporate profit retention policies because $\alpha_3 > 0$. In theory, $\alpha_3 > 0$ could also be due to liquidity constraints, but in practice such liquidity constraints are a lot less likely to apply to consumption supported by corporate wealth, compared with other forms of wealth, because shareholders typically are wealthier and more creditworthy than the average individual.

An alternative way in which a rise in corporate saving might influence total saving even in the absence of a "thick" corporate veil is through the distribution of income. If an increase in corporate saving as a percentage of GDP is the reflection of a higher profit share of GDP (as seems to be the case empirically, see Karabarbounis and Neiman, 2014; Chen et al., 2017; Behringer and van Treeck, 2018), then it may be associated with a change in the economy-wide saving rate if wealthier households benefit disproportionally from the rise in the profit share and have a lower marginal propensity to consume ($\alpha_2 < \alpha_1$ in Equation 4.1). In the empirical analysis to be presented in Section 4.4, we will thus control for income distribution when testing for the existence of a corporate veil in our current account estimations.

There is some formal evidence for the corporate veil in different strands of the literature that developed independently of the literature on current account determinants, but the

results from previous studies are mixed. Feldstein (1973) and Feldstein and Fane (1973) found a positive marginal propensity to consume from corporate retained earnings which was, however, lower than the marginal propensity to consume from income. Similar results were found by Sumner (2004), based on estimations of the aggregate consumption function for the United Kingdom. Poterba (1991) and Monogios and Pitelis (2004) and Baker et al. (2007) report evidence of a significant corporate veil for different Anglo Saxon countries. Grigoli et al. (2018) in a panel estimation analysis for a sample of 165 countries for the period 1981-2012 find that a rise in the corporate saving-to-gross domestic income ratio by 1 percentage point leads to a decrease in the household saving-to-gross domestic income ratio by 0.58 percentage points, *i.e.*, households do not fully offset the rise in corporate saving. According to the results by Bebczuk and Cavallo (2016), for a sample of 47 countries over 1995-2013, a $1 increase in business saving raises private saving by $0.6.

4.3 The data

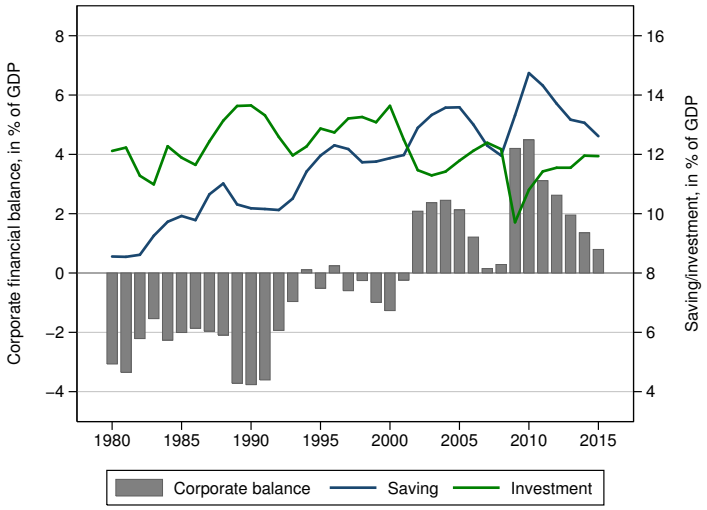
This section documents a number of stylized facts of corporate sector and current account balances. We focus primarily on the G7 economies and China. These eight countries accounted for more than 60% of global GDP during the last decade.

Figure 4.1 shows the evolution of GDP-weighted averages of corporate saving, investment and net lending for the G7 countries over the period 1980-2015.[3] It shows that corporate net lending was negative throughout the 1980s and 1990s, turned positive at the beginning of the 2000s and has remained in positive territory since then. Moreover, it is obvious from Figure 4.1 that the rise in corporate net lending has been driven primarily by the rise in corporate saving. Corporate investment shows cyclical fluctuations around a largely constant trend, even though the sharp decline of corporate investment during the global financial crisis after 2007 may constitute a break with the past in corporate behavior.

Figure 4.2 contains the same information as Figure 4.1, but now separately for each of the G7 countries and China. We can observe a pronounced secular upward trend in the corporate financial balance driven by a rise in corporate saving especially in Germany, Italy, and Japan. By comparison, in Canada, France, and the United Kingdom, variations in corporate net lending are more of a cyclical nature, and they are less clearly driven by corporate saving. In the United States, there is no clear trend over time in either corporate saving or corporate investment prior to the outbreak of the financial crisis, which triggered both a rise in corporate saving and a fall in corporate investment. In

[3] We do not include China here because it is a clear outlier in terms of both the corporate saving-to-GDP ratio and the corporate investment-to-GDP ratio; see Figure 4.2.

Figure 4.1: Saving, investment, and financial balance, corporate sector, G7



China, we observe pronounced and long-lasting swings in both corporate saving and corporate investment since 1990.

Figure 4.3 shows the development of current account balances and sectoral financial balances for the G7 countries and China for the period 1980-2015. China, Germany, Japan, the United Kingdom, and the United States were those countries with the largest current account balances worldwide just before the Great Recession. In Germany and Japan, in particular, the corporate sector turned from a pronounced net borrowing position in the 1980s and 1990s to a large and persistent net lending position since the late 1990s/early 2000s. The corporate sector thus accounts for a large part of the build-up of current account surpluses in these countries prior to the Great Recession. In recent years, both China and Japan have significantly reduced their current account surpluses, whereas Germany has maintained a large current account surplus of about 7 percent of GDP, which corresponds roughly to its pre-crisis level. In the case of Japan, the re-balancing of the current account in the wake of the financial crisis was due primarily to the decrease of the fiscal balance, while corporate net lending fluctuated around its pre-crisis level of 8 percent of GDP. In China, much of the pre-crisis increase of the current account balance since the 1990s, as well as the subsequent re-balancing, were driven primarily by movements in corporate net lending. The United Kingdom and the United States, the two main current account deficit countries prior to the global financial crisis, experienced large decreases in the household financial balance during the last two decades before the crisis, but no clear trend in the corporate financial balance. Overall, there is little immediate evidence of an offsetting relationship between corporate and household net lending across the G7 countries and China.

Figure 4.2: Saving, investment, and financial balance, corporate sector, G7 and China

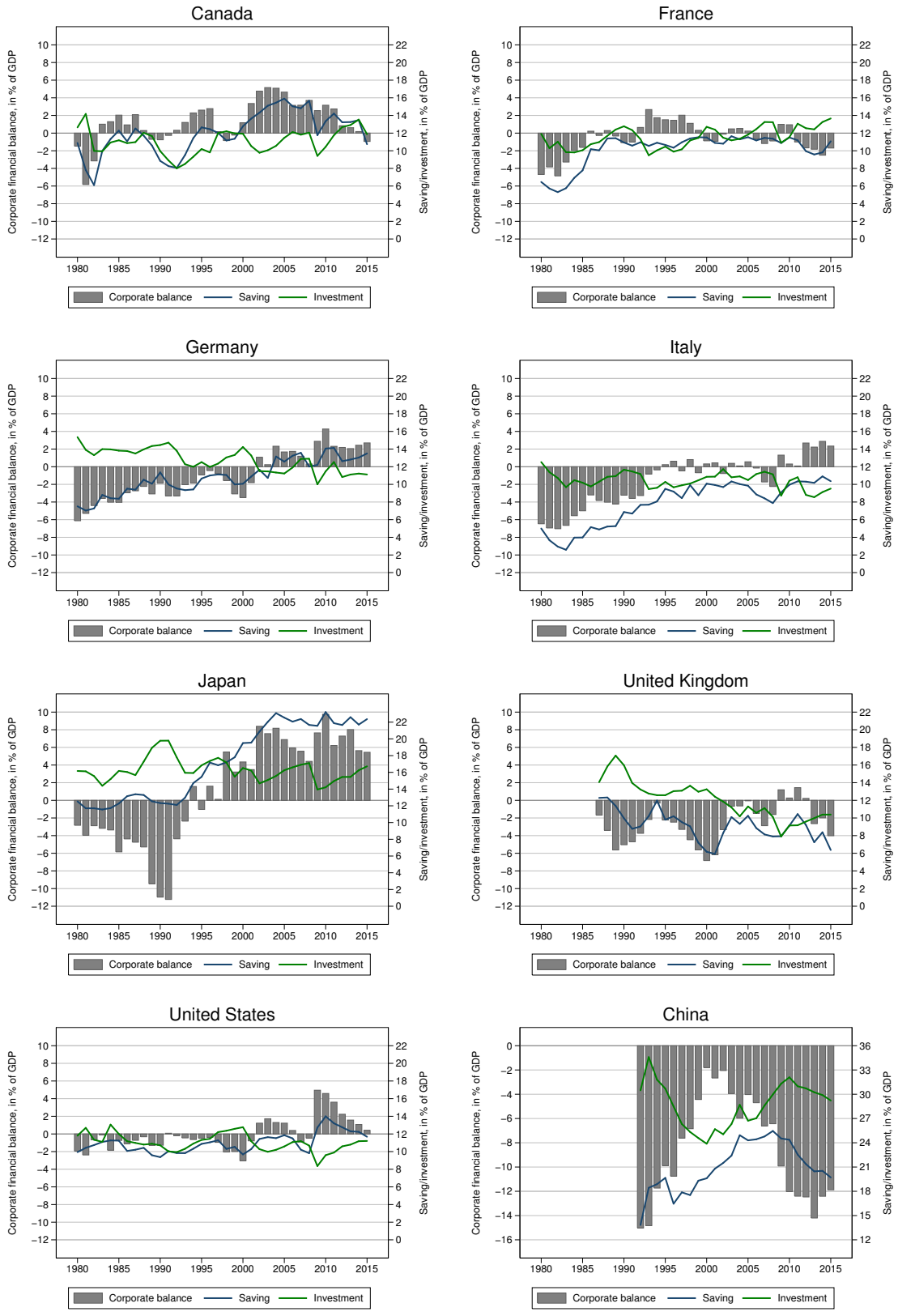


Figure 4.3: Sectoral financial balances, G7 and China

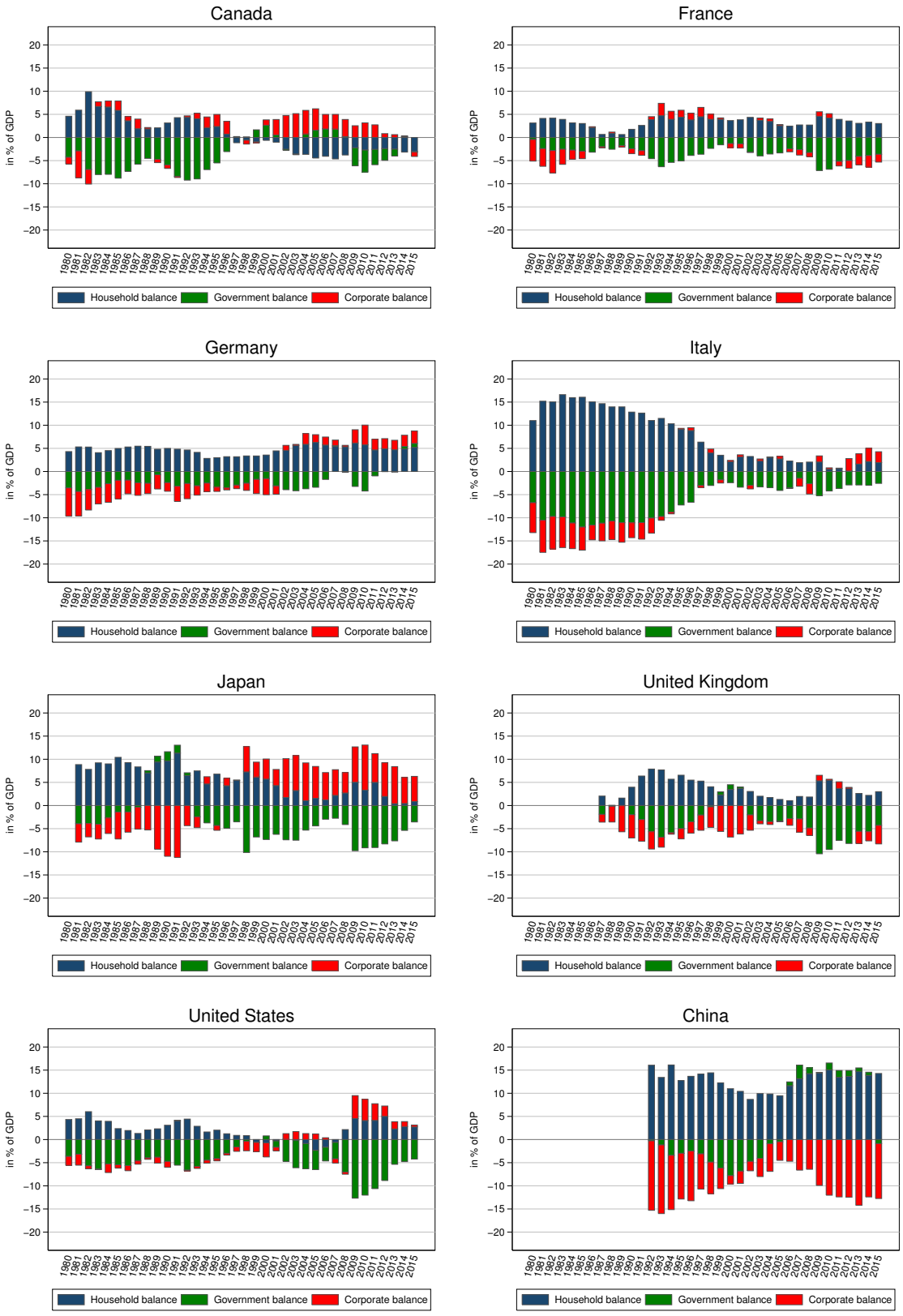
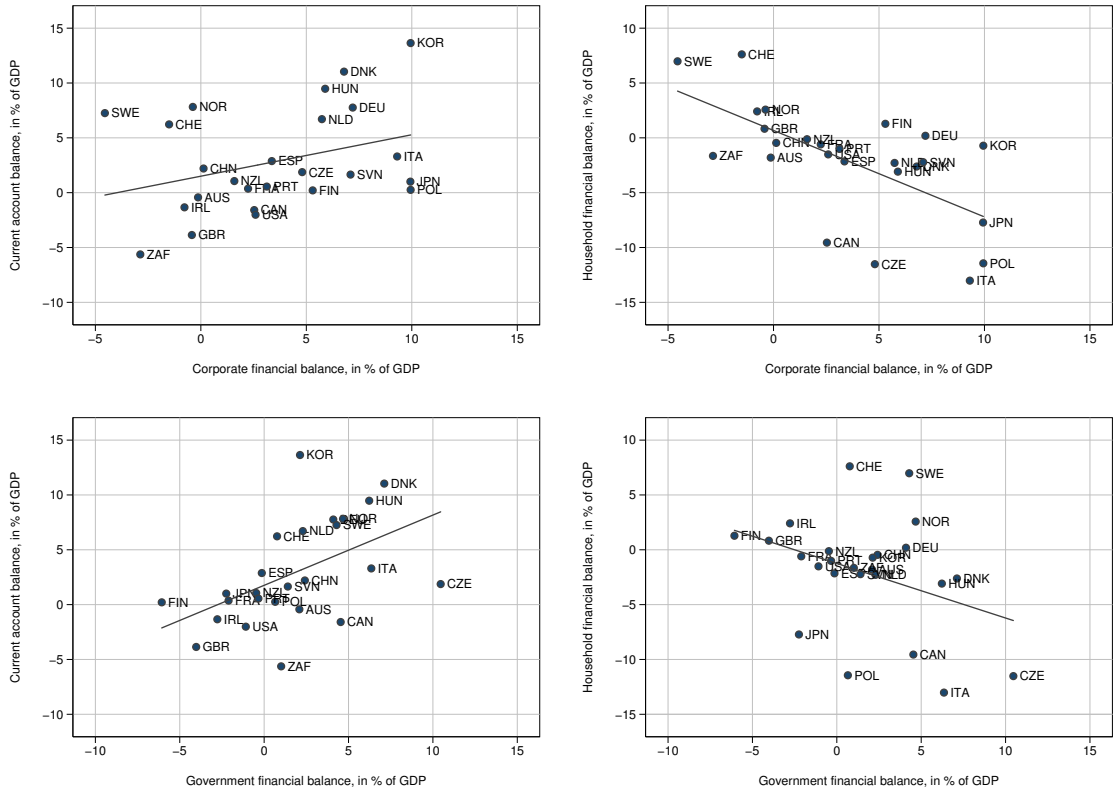


Figure 4.4: Sectoral financial balances and current account balances

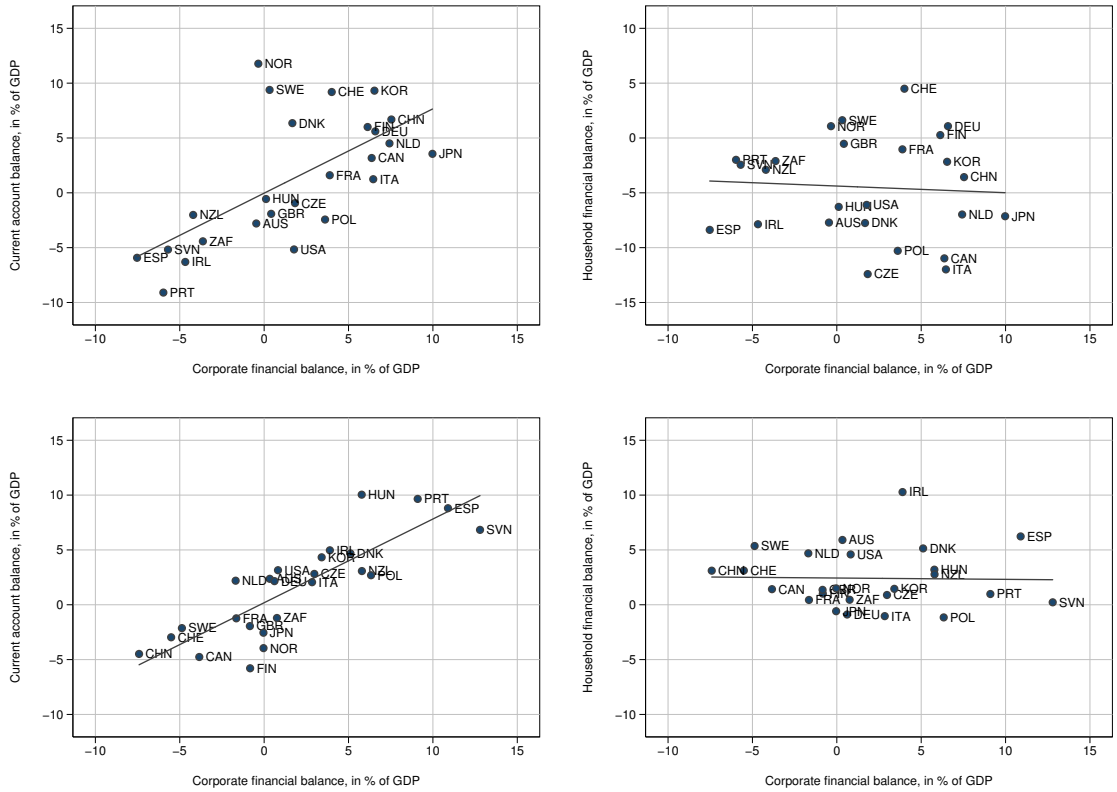


Notes: The figure shows the change in, respectively, the government financial balance and the corporate financial balance in % of GDP (horizontal axis) against the change in, respectively, the current account balance in % of GDP and the private household financial balance in % of GDP (vertical axis). Changes are calculated for the period 1980/83-2012/15 or for the longest available time span within this period.

In Figure 4.4, we plot changes in the corporate financial balance (upper panel) against changes in the current account balance (left panel) and against changes in the household financial balance (right panel) for a sample of 25 countries (multi-year averages 1980/83 versus 2012/15). There is a clear positive relationship between changes in the corporate financial balance and the current account balance, despite a negative correlation of changes in the corporate and the household financial balance. This pattern is *prima facie* consistent with the existence of a corporate veil. Changes in corporate net lending feed through to the current account, even although they are offset in part by opposite changes in household net lending. Note that plotting changes in the government financial balance against changes in the current account and the household financial balance (lower panel of Figure 4.4) yields a very similar picture.

In Figure 4.5, we plot changes in the corporate financial balance against changes in the current account balance and the household financial balance for two sub-periods: prior to the global financial crisis (upper panel, 1980/83 versus 2004/07), and since the outbreak

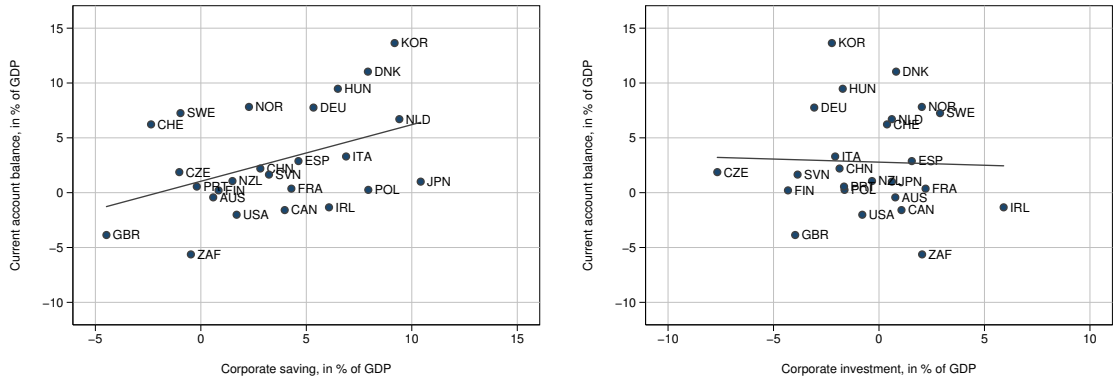
Figure 4.5: Corporate financial balances and current account balances, pre- and post-crisis periods



Notes: The figure shows the change in the corporate financial balance in % of GDP (horizontal axis) against the change in, respectively, the current account balance in % of GDP and the private household financial balance in % of GDP (vertical axis). In the upper (lower) panel of the figure, changes are calculated for the period 1980/83-2004/07 (2004/07-2012/15) or for the longest time span within this period.

of the crisis (lower panel, 2004/07 versus 2012/15). Figure 4.5 reveals an even stronger correlation between changes in corporate net lending and the current account for both sub-periods, compared to the full sample period (see Figure 4.4). As can be seen in the upper panel of Figure 4.5, the pre-crisis emergence of current account imbalances were largely driven by differences in corporate net lending, with large increases in such large surplus countries as China, Japan, South Korea, the Netherlands, and Germany, and no or smaller increases in such large deficit countries as Spain, the United Kingdom, and the United States. By contrast, there was no clear relationship between changes in corporate net lending and household net lending. For example, Japan, Spain, and the United States all displayed similar decreases in the household financial balance despite very different current account developments. For the post-crisis period, changes in the corporate financial balance and changes in the household financial balance are uncorrelated, an observation that IMF (2017*a*) interprets as indicative of a thickening of a corporate veil.

Figure 4.6: Corporate saving, corporate investment, and current account balances



Notes: The figure shows the change in, respectively, corporate saving in % of GDP and corporate investment in % of GDP (horizontal axis) against the change in the current account balance in % of GDP (vertical axis). Changes are calculated for the period 1980/83-2012/15 or for the longest time span within this period.

Corporate net lending played a considerable role for current account rebalancing, e.g., in China, Japan, or Spain.

Figure 4.6 shows that the correlation with the current account balance is stronger for changes in corporate saving than for changes in corporate investment. This observation suggests that movements in corporate saving in particular feed through to the national saving-investment balance, in line with the corporate veil argument.

In the next section, we test the corporate veil hypothesis more formally in a multivariate panel estimation framework.

4.4 Empirical analysis

4.4.1 Analytical framework

The current account balance is defined as the difference between domestic saving and domestic investment or equivalently as the sum of the financial balances (income minus expenditure, or saving minus investment) of the private household, the corporate, and the government sectors:

$$S - I = CA \tag{4.2}$$

$$S^{HH} + S^{CORP} + S^{GOV} - I^{HH} - I^{CORP} - I^{GOV} = CA \tag{4.3}$$

$$FB^{HH} + FB^{CORP} + FB^{GOV} = CA \tag{4.4}$$

where CA is the current account balance and S, I and FB denote, respectively, saving, investment and the financial balance of the household sector, HH, the corporate sector, $CORP$, and the government sector, GOV.

While Equation 4.2 provides the basis for estimating current account determinants in the state-of-the-art literature, the sectoral accounting perspective inherent in Equations 4.3 and 4.4 usually is not made explicit in the literature. For example, the External Balance Assessment (EBA) methodology developed by the IMF uses a refined version of Equation 4.2 as a starting point for the estimation of current account equations. Combining this with a balance-of-payment constraint, a solvency constraint and a multilateral constraint[4], yields the following reduced form equation for the current account balance (see Phillips et al., 2013):

$$CA = f(X_I, X_S, X_{CA}, X_{CF}, Z, Z^{wo}, \Delta R) \tag{4.5}$$

Equation 4.5 states that the current account is determined by the domestic output gap, Z, and the world output gap, Z^{wo}, changes in foreign exchange reserves ΔR, and a host of saving/consumption shifters, X_S, investment shifters, X_I, export/import shifters, X_{CA}, and capital account shifters, X_{CF}. Saving/consumption shifters include such variables as income per capita, demographics, expected income (shifts in permanent income), social insurance, the budget balance, financial policies, the institutional environment, and net exports of exhaustible resources. Investment shifters include income per capita, expected income/output, governance, financial policies. Export/import shifters include the world commodity price-based terms of trade. Capital account shifters include indicators of global risk aversion, the "exorbitant privilege" that comes with reserve currency status, and capital controls.

While it is recognized in the literature that both the government sector and the broad "institutional environment" affect the current account, corporations, despite being one of the most pervasive institutional features of modern capitalist economies, have not been considered explicitly as a driving force of national saving and investment patterns in Equations 4.2 and 4.5. By making use of Equations 4.3 and 4.4, we can introduce this sectoral perspective in an explicit fashion and test for both non-Ricardian and corporate veil effects. If households fail to see through the institutional veils of the government and corporate sectors, an increase (decrease) in government saving, S^{GOV}, or corporate saving, S^{CORP}, will be less than fully offset by lower (higher) personal saving, S^{HH}, given all other saving determinants. Hence, in the presence of a "thick" government or corporate veil, changes in the government financial balance, FB^{GOV}, or the corporate financial balance, FB^{CORP}, will feed through to the current account.

[4]The multilateral constraint implies that each country's variable should be measured relative to a GDP-weighted world average of the same variable.

Note that most empirical analyses use the government financial balance, rather than government saving and investment separately, as a regressor in current account estimations. The underlying assumption seems to be that government investment crowds out private investment to the same extent as households offset changes in government saving by adjusting personal saving. As a first step, we can thus introduce the corporate financial balance into our current account equations on the same level as the fiscal balance. A positive relation between the corporate financial balance and the current account can be due to difficulties in piercing of the corporate veil. By disaggregating corporate net lending, we can also test whether the corporate sector affects the current account primarily through saving or investment. Including corporate saving in the current account estimations provides a direct test of incomplete piercing of the corporate veil. Ca' Zorzi et al. (2012) suggest to include investment (but do not discuss the role of corporate saving) as a regressor because it is a demand variable that is associated with a worsening of the trade balance (unless the Feldstein-Horioka hypothesis strictly applies). Moreover, investment should lead to productivity gains in the future, and hence higher expected wealth, giving rise to an intertemporal adjustment which results in a current account deficit (see Glick and Rogoff, 1995; Ca' Zorzi et al., 2012). A further rationale for including corporate investment in the current account estimation (either indirectly as a component of the corporate financial balance, or directly as a separate regressor) is that previous studies have found that most variables commonly used in current account estimations appear to mainly operate through the saving channel (Phillips et al., 2013).

4.4.2 Estimation strategy

The empirical analysis builds on the panel estimation literature on current account determinants, which includes amongst others Chinn and Prasad (2003), Lee et al. (2008), Gruber and Kamin (2007, 2009), Chinn and Ito (2007, 2008), Phillips et al. (2013), and Chinn et al. (2014). The most general version of the regression specification can be written as follows:

$$CA_{i,t} = \beta_0 + FUND_{i,t}\Gamma + FIN_{i,t}\Psi + CYC_{i,t}\Upsilon + POL_{i,t}\Pi + \beta_1 CORP_{i,t} + \varepsilon_{i,t} \qquad (4.6)$$

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$ denote the cross-sectional and time dimensions, respectively. The dependent variable $CA_{i,t}$ is the current account balance in percent of GDP. The choice of explanatory variables largely follows the literature or is dictated by data availability. $FUND_{i,t}$ refers to traditional fundamentals including the net foreign asset (NFA) position, the relative level of output per worker, demographic factors such as the old-age dependency ratio and population growth, the financial center status, and risks associated with the institutional and political environment. $FIN_{i,t}$ refers to financial

factors such as the reserve currency status and private credit in percent of GDP. $CYC_{i,t}$ refers to cyclical factors including the output gap and the terms of trade gap. $POL_{i,t}$ refers to policy-related factors such as the cyclically-adjusted fiscal balance in percent of GDP, the degree of capital account openness interacted with the level of development, and private credit in percent of GDP as an indirect indicator of policies to contain financial excesses. In addition to these standard explanatory variables that are frequently used in the literature on current account determinants, we include the cyclically-adjusted corporate financial balance in percent of GDP, $CORP_{i,t}$, which in some estimations is further disaggregated into corporate saving (retained profits) and corporate investment, both in percent of GDP. $\varepsilon_{i,t}$ is a residual error term with zero mean.

We work with an unbalanced panel that includes 25 countries for the period 1980-2015. The sample consists largely of advanced economies but also a few emerging economies. The following countries are included in the sample: Australia, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, South Korea, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, South Africa, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Variable definitions and data sources are provided in Appendix 4.A.

Most of the explanatory variables in the current account regression specification are converted into deviations from a GDP-weighted sample mean.[5] That is, each country's variables are measured relative to a weighted average of other countries' values prevailing at the same time (see Appendix 4.B for details). The cross-sectional demeaning accounts for the fact that a given economy's current account is by nature measured relative to other countries, so that it must be determined by both its own and its trading partners' characteristics.

We estimate a static current account regression model using pooled generalized least squares (GLS) based on a sample of annual observations, following Phillips et al. (2013). The purpose of using annual data rather than non-overlapping multi-year averages is to uncover cyclical sources of current account dynamics. As the current account displays autocorrelation, we implement a panel-wide AR(1) correction.

One concern in the regression specification is the problem of endogeneity due to potential reverse causality. Some of the explanatory variables such as the fiscal balance or the corporate balance are likely to be influenced by current account developments. In order to address the issue of endogeneity more comprehensively, we perform instrumental variables estimations where the fiscal balance and the corporate balance are instrumented with selected variables.[6]

[5]This treatment does not apply to few variables because it is already implicit in their definition (e.g. net foreign assets, terms of trade, own currency's share in world reserves).

[6]The fiscal balance is instrumented with the lagged world fiscal balance, lagged world GDP growth, lagged world output gap, lagged output gap, lagged U.S. corporate credit spread, the polity index, the exchange rate regime, lagged unemployment rate, and the time average of the fiscal balance. The corporate balance

Table 4.1: Current account regression model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regressor	CA	CA	CA	CA	CA	SAV	INV	FB^{HH}	FB^{HH}
L.Net foreign assets (% of GDP)	0.037***	0.040***	0.035***	0.038***	0.039***	0.052***	0.011**	0.025***	0.023***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.005)	(0.006)	(0.006)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.056***	-0.061***	-0.055***	-0.058***	-0.059***	-0.066***	0.000	-0.028**	-0.027*
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.012)	(0.013)	(0.014)
L.Output per worker (relative to top 3 economies)	-0.001	-0.017	-0.000	-0.003	-0.008	-0.015	0.015	-0.079***	-0.078***
	(0.022)	(0.020)	(0.021)	(0.022)	(0.021)	(0.027)	(0.021)	(0.022)	(0.021)
L.Relative output per worker × Capital openness	0.075***	0.084***	0.070**	0.077***	0.077***	0.065**	-0.033	0.096***	0.087***
	(0.028)	(0.026)	(0.027)	(0.028)	(0.026)	(0.033)	(0.026)	(0.027)	(0.026)
Dependency ratio	-0.078*	-0.079*	-0.060	-0.081*	-0.070*	-0.185***	-0.089***	-0.037	-0.011
	(0.046)	(0.042)	(0.044)	(0.045)	(0.041)	(0.047)	(0.033)	(0.045)	(0.045)
Population growth	-1.765***	-1.783***	-1.569***	-1.805***	-1.649***	-1.481***	0.293	-1.535***	-1.419***
	(0.532)	(0.483)	(0.517)	(0.518)	(0.482)	(0.515)	(0.374)	(0.497)	(0.509)
Financial center status	0.027***	0.023**	0.025**	0.026***	0.022**	0.011	-0.009*	0.021***	0.023***
	(0.011)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.005)	(0.007)	(0.007)
Institutional/political environment	-0.032	-0.034	-0.030	-0.031	-0.029	-0.076***	-0.054***	-0.060***	-0.061***
	(0.023)	(0.022)	(0.022)	(0.023)	(0.022)	(0.024)	(0.019)	(0.023)	(0.023)
Reserve currency status	-0.031***	-0.028***	-0.025**	-0.031***	-0.026**	-0.028**	0.014*	-0.012	-0.003
	(0.012)	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)	(0.008)	(0.011)	(0.012)
Private credit (% of GDP)	-0.028***	-0.026***	-0.025***	-0.028***	-0.024***	-0.029***	-0.001	0.010	0.009
	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.006)	(0.007)	(0.008)
Output gap	-0.314***	-0.317***	-0.332***	-0.315***	-0.325***	0.139***	0.406***	-0.219***	-0.252***
	(0.053)	(0.053)	(0.053)	(0.054)	(0.055)	(0.052)	(0.049)	(0.050)	(0.052)
Terms of trade gap × Trade openness	0.306***	0.305***	0.309***	0.306***	0.310***	0.250***	-0.050	0.041	0.036
	(0.040)	(0.040)	(0.040)	(0.040)	(0.041)	(0.035)	(0.038)	(0.036)	(0.037)
L.Cyclically-adjusted fiscal balance (% of GDP)	0.133***	0.221***	0.143***	0.141***	0.163***	0.268***	0.120***	-0.168***	-0.083**
	(0.036)	(0.040)	(0.036)	(0.036)	(0.037)	(0.034)	(0.032)	(0.038)	(0.036)
L.Cyclically-adjusted corporate balance (% of GDP)	-	0.125***	-	-	-	-	-	-0.199***	-
		(0.039)						(0.037)	
L.Corporate saving (% of GDP)	-	-	0.154***	-	0.186***	0.240***	0.073*	-	-0.149***
			(0.048)		(0.049)	(0.051)	(0.038)		(0.045)
L.Corporate investment (% of GDP)	-	-	-	-0.006	-0.070	0.447***	0.722***	-	0.244***
				(0.050)	(0.051)	(0.057)	(0.049)		(0.048)
Observations	706	706	706	706	706	706	706	706	706
Countries	25	25	25	25	25	25	25	25	25
R-squared	0.616	0.667	0.648	0.620	0.667	0.759	0.775	0.526	0.489
RMSE	0.029	0.028	0.028	0.029	0.028	0.036	0.026	0.032	0.033

Notes: CA is the current account balance in % of GDP, SAV is total saving in % of GDP, INV is total investment in % of GDP, FB^{HH} is the household financial balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 4.A for a detailed description of the data.

Another concern is an estimation bias that could arise if relevant explanatory variables explaining the cross-sectional variation in the data are not included in the specification but are correlated with other variables. In order to capture unobserved heterogeneity, we add country-specific effects to the current account regression specification. However, as noted by Chinn and Prasad (2003), including country-specific effects removes much of the cross-country variation which is problematic in the context of current account estimations since much of the variation in the data stems in fact from the cross-sectional dimension. Furthermore, Phillips et al. (2013) argue that country-specific effects do not provide an economic explanation of observed current account balances and may reflect the uncaptured effects of sustained distortions on current account balances.

4.4.3 Results

Does corporate sector behavior affect the current account?

Table 4.1 presents the results for different variants of Equation 4.6, based on pooled GLS estimation. Column 1 shows the results for a baseline model without any corporate sector variables. The set of explanatory variables is similar to that applied in Phillips et al. (2013).[7] We use lagged variables in those cases where simultaneity bias may be expected. Estimated coefficients are mostly statistically significant and have expected signs and plausible magnitudes in line with previous studies (Chinn and Prasad, 2003; Lee et al., 2008; Phillips et al., 2013).

The 0.04 coefficient on initial NFA implies that an increase in NFA of 10 percent of GDP raises the current account balance by about 0.4 percent of GDP. The sign of the coefficient is theoretically ambiguous, but the positive sign estimated here is consistent with previous findings. The regression includes a (statistically significant) interaction term allowing for a non-linear relationship between the initial NFA position and the current account.[8] Relative output per worker, in interaction with capital account openness, is positively related to the current account, a result that may be explained through catching-up effects. An increase in relative output per worker by 10 percentage points leads to a rise in the current account by 0.75 percentage points for countries with an open capital account. In countries with capital controls, relative productivity has virtually no effect on the current account. A higher old-age dependency ratio and higher population growth reduce the

is instrumented with the lagged world corporate balance, lagged world GDP growth, lagged world output gap, lagged output gap, lagged U.S. corporate credit spread, lagged stock market capitalization, lagged stock price volatility, and the time average of the corporate balance. The first stage regression also controls for all other explanatory variables in the current account regression.

[7] We experimented with other variables used by Phillips et al. (2013) for which data are available, including global capital market conditions or global risk aversion. However, we dropped these variables from our regression model as the coefficients turned out to be statistically insignificant.

[8] Catão and Milesi-Ferretti (2014) suggest that crisis probabilities increase when the net foreign debt is above 60 percent of GDP.

current account balance, as can be expected in terms of the life-cycle theory of saving. Financial center status is positively related to the current account balance, as expected. Financial centers are found to have a current account balance about 2.7 percent of GDP higher than the other countries in our sample. Risks associated with the institutional and political environment are not statistically significant determinants of current accounts in our estimation. Reserve currency status is negatively linked to the current account, in line with the standard "exorbitant privilege" argument. For every 10 percent of global reserves held in its own currency, a country experiences a current account deficit which is lower by 0.31 percentage points. A higher private credit-to-GDP ratio also significantly reduces the current account balance. This result is difficult to interpret theoretically but may reflect either financial liberalization or the failure of policies to prevent financial excesses, which can cause demand booms, cause real appreciation and weaken current accounts. According to our estimates, an increase in relative private credit to GDP by 10 percentage points is associated with a weaker current account by 0.28 percentage points. The output gap enters significantly with a negative coefficient and reflects cyclical influences on the current account balances. This means that the estimated coefficients on all other variables are measuring their effects for given values of the relative output gap. The interaction term of the terms of trade gap and trade openness is also statistically significant, with the expected positive sign. At the sample mean for trade openness, an increase in the terms of trade relative to trend by 1 percentage point is associated with an improvement of the current account of about 0.2 percent of GDP. The coefficient on the cyclically-adjusted fiscal balance implies that a 1 percentage point increase in the cyclically-adjusted government budget balance (relative to trading partners) leads to a 0.13 percentage point increase in the current account balance in percent of GDP. This result is in line with non-Ricardian household behavior.

When the cyclically-adjusted corporate financial balance is included in the model as an additional regressor (Column 2), the model fit improves, as indicated by the R-squared and the root mean squared error (RMSE). The estimated coefficient on the corporate financial balance is highly significant, and of positive sign. It implies that a 1 percentage point increase in corporate net lending (relative to trading partners) leads to a 0.13 percentage point increase in the current account. Including only corporate saving in the current account regression (Column 3) leads to the same result. A rise in corporate saving (relative to trading partners) by 1 percentage point increases the current account by approximately 0.15 percentage points. This result is consistent with incomplete piercing of the corporate veil. It is robust to the inclusion of corporate investment in the regression (Column 5), but corporate investment itself does not have a significant effect on the current account balance when included either alone or together with corporate saving (Columns 4 and 5).

In Columns 6 and 7, we estimate the same equations separately for national saving and

national investment as the dependent variable. In line with Phillips et al. (2013), we find that the majority of the significant variables in the current account regressions appear to operate mainly through the saving channel. Both corporate saving and corporate investment are significant in the regressions for domestic saving and domestic investment. However, corporate saving raises total saving more than it raises total investment, and corporate investment raises total investment more than it raises total saving. These findings are again consistent with the results from the current account regressions and with the corporate veil hypothesis. In Columns 8 and 9, the dependent variable is the household financial balance. The effects of almost all of the explanatory variables have the same size and are similar in magnitude as in the current account regressions, in line with the theoretical focus on the household sector in intertemporal models of the current account. The estimated effects of the corporate sector variables in the household financial balance regressions suggest, however, that the total volumes of national saving and investment partly are beyond the control of the household sector. Theoretically, when households fully pierce the corporate veil, an increase in corporate saving should be fully offset by opposite changes in household saving, given fundamentals. However, the coefficients on corporate net lending and corporate saving are just -0.2 and -0.15, respectively.

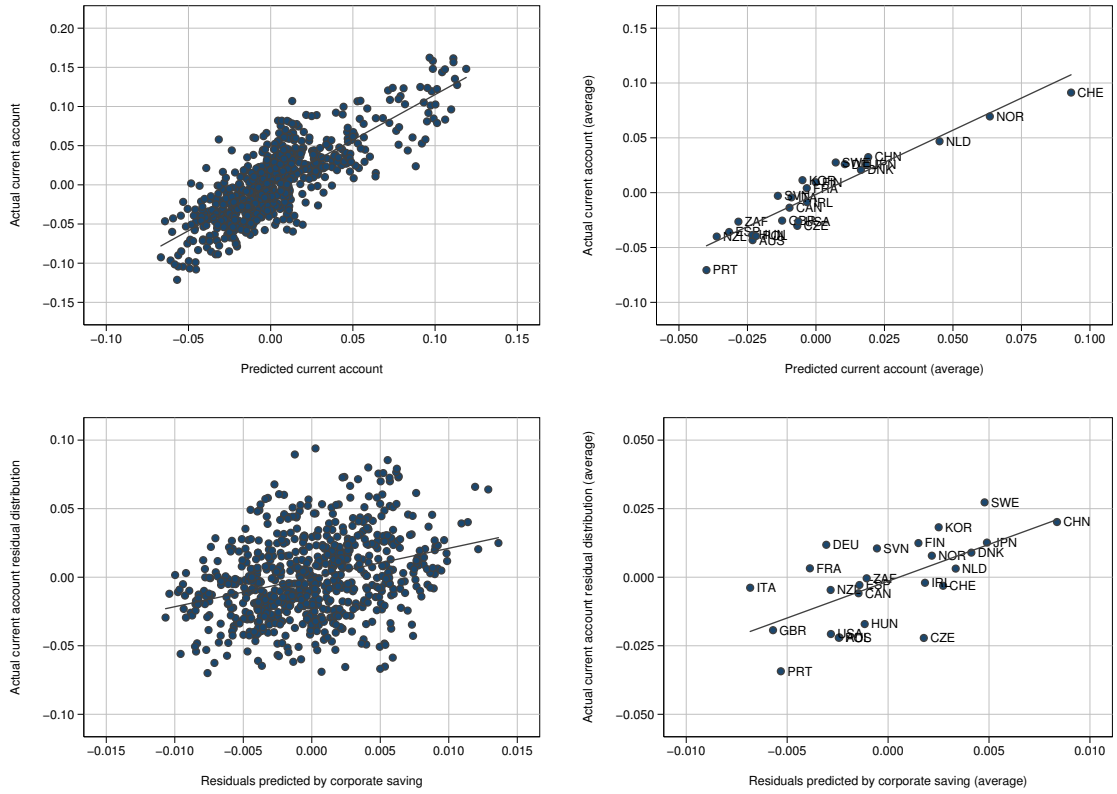
The corporate sector variables included in the pooled regression of Table 4.1 are not only statistically, but also economically significant. The graphs shown in Figure 4.7 are based on the estimation results reported in Column 3 of Table 4.1, where corporate saving is included as an explanatory variable. While the upper panel of Figure 4.7 shows the overall very good performance of the model, the bottom left graph shows that the corporate saving measure explains 10.5 percent of the otherwise unexplained variation in current account balances. The bottom right graph of Figure 4.7 shows that the corporate saving variable can explain a considerable part of the otherwise unexplained cross-country variation in current account balances over the long run, and hence contributes to the observed current account imbalances. For example, the corporate saving variable almost fully explains the average residuals of a current account regression without any corporate sector variables for China, Japan, and the United Kingdom. Overall, we conclude that taking account of corporate sector behavior significantly improves our understanding of the current account.[9]

Robustness

Table 4.2 presents several robustness checks. In Columns 1-2, both the fiscal balance and the corporate sector variables are instrumented, with results qualitatively very similar to those discussed in the previous Subsection. Note that the estimated coefficients on both the fiscal and the corporate financial balance are now larger, compared to the estimations

[9]Note that the estimation results are robust to using non-financial corporate sector variables.

Figure 4.7: Role of corporate saving: predicted and actual current account residuals



Notes: The upper-left (upper-right) graph shows the (average) predicted current account balances from the model in Table 4.1, Column 3 (horizontal axis) against the (average) actual current account balances (vertical axis). In the bottom-left graph, the vertical axis measures the actual current account residuals from the baseline model without any corporate sector variables reported in Table 4.1, Column 1. The horizontal axis shows the current account levels predicted by regressing current account residuals (from the baseline model without any corporate sector variables) on the corporate saving variable. The bottom-right graph shows the respective country-specific time averages.

reported in Table 4.1, and in line with recent estimates for the instrumented cyclically-adjusted fiscal balance obtained by IMF (2018).

In Columns 3-4, country fixed effects are added to the regression models including either the corporate financial balance (Column 3) or corporate saving and investment separately (Column 4) as explanatory variables. While the point estimates of each of the corporate sector variables increase in absolute value, compared with the models from Table 4.1, Columns 2 and 5, corporate investment now enters with a statistically significant coefficient. We hypothesize that this result is in part due to persistent cross-country differences in the corporate investment-to-GDP ratio, with east-Asian countries in particular being permanent outliers. To investigate this possibility further, and because including country fixed effects has the inconvenience of effectively removing much of the cross-country variation in the data, we also estimate the models for a smaller sample with

Table 4.2: Current account regression model: robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Regressor	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*
L.Net foreign assets (% of GDP)	0.029***	0.029***	0.036***	0.037***	0.036***	0.030***	0.036***	0.037***	0.040***	0.038***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.040***	-0.045***	-0.075***	-0.073***	-0.060***	-0.051***	-0.058***	-0.060***	-0.061***	-0.059***
	(0.015)	(0.015)	(0.015)	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)	(0.014)	(0.014)
L.Output per worker (relative to top 3 economies)	-0.046**	-0.029	0.016	0.030	-0.013	-0.006	0.004	-0.007	-0.022	-0.012
	(0.023)	(0.025)	(0.032)	(0.033)	(0.029)	(0.031)	(0.030)	(0.029)	(0.020)	(0.020)
L.Relative output per worker × Capital openness	0.091***	0.081***	0.038	0.039	0.082**	0.079**	0.072**	0.079**	0.090***	0.082***
	(0.029)	(0.030)	(0.029)	(0.030)	(0.035)	(0.037)	(0.036)	(0.035)	(0.025)	(0.026)
Dependency ratio	-0.035	-0.025	-0.131***	-0.146***	-0.009	0.002	-0.023	-0.017	-0.095**	-0.086**
	(0.048)	(0.047)	(0.043)	(0.043)	(0.039)	(0.044)	(0.043)	(0.040)	(0.041)	(0.041)
Population growth	-1.492***	-1.123**	-0.881	-0.773	-1.438***	-1.256**	-1.537***	-1.428***	-1.900***	-1.755***
	(0.534)	(0.543)	(0.573)	(0.582)	(0.465)	(0.530)	(0.502)	(0.464)	(0.472)	(0.478)
Financial center status	0.028**	0.023**	0.051**	0.041***	0.026***	0.031***	0.029***	0.024***	0.018**	0.018**
	(0.012)	(0.012)	(0.020)	(0.011)	(0.009)	(0.011)	(0.010)	(0.009)	(0.009)	(0.009)
Institutional/political environment	-0.054**	-0.045*	0.014	0.013	-0.031	-0.034	-0.029	-0.030	-0.035	-0.031
	(0.024)	(0.024)	(0.023)	(0.024)	(0.022)	(0.023)	(0.023)	(0.022)	(0.021)	(0.022)
Reserve currency status	-0.014	-0.012	0.022	0.025	-0.027***	-0.025**	-0.034***	-0.031***	-0.029***	-0.027**
	(0.012)	(0.012)	(0.019)	(0.019)	(0.010)	(0.012)	(0.011)	(0.010)	(0.010)	(0.010)
Private credit (% of GDP)	-0.020**	-0.017**	-0.028***	-0.027***	-0.026***	-0.026***	-0.028***	-0.024***	-0.028***	-0.026***
	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)
Output gap	-0.236***	-0.162**	-0.380***	-0.334***	-0.272***	-0.268***	-0.239***	-0.252***	-0.320***	-0.326***
	(0.066)	(0.078)	(0.053)	(0.056)	(0.052)	(0.052)	(0.053)	(0.054)	(0.053)	(0.055)
Terms of trade gap × Trade openness	0.182***	0.199***	0.282***	0.288***	0.305***	0.311***	0.309***	0.313***	0.313***	0.317***
	(0.045)	(0.046)	(0.042)	(0.041)	(0.041)	(0.040)	(0.040)	(0.041)	(0.040)	(0.040)
L.Cyclically-adjusted fiscal balance (% of GDP)	0.509***	0.332***	0.222***	0.141***	0.224***	0.137***	0.144***	0.167***	0.222***	0.160***
	(0.103)	(0.106)	(0.045)	(0.039)	(0.040)	(0.036)	(0.036)	(0.037)	(0.040)	(0.037)
L.Cyclically-adjusted corporate balance (% of GDP)	0.385***	-	0.185***	-	0.143***	-	-	-	0.129***	-
	(0.089)		(0.043)		(0.040)				(0.039)	
L.Corporate saving (% of GDP)	-	0.496***	-	0.161***	-	0.110**	-	0.168***	-	0.184***
		(0.091)		(0.057)		(0.051)		(0.049)		(0.048)
L.Corporate investment (% of GDP)	-	-0.300***	-	-0.288***	-	-	-0.133**	-0.190***	-	-0.070
		(0.105)		(0.059)			(0.055)	(0.056)		(0.051)
Net FDI flows (% of GDP)	-	-	-	-	-	-	-	-	0.167**	0.163**
									(0.068)	(0.069)
Observations	704	704	706	706	648	648	648	648	706	706
Countries	25	25	25	25	23	23	23	23	25	25
R-squared	0.621	0.632	0.771	0.782	0.639	0.619	0.567	0.628	0.686	0.684
RMSE	0.029	0.029	0.023	0.022	0.028	0.029	0.031	0.029	0.027	0.027

Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parentheses. In models (1) and (2), the cyclically-adjusted fiscal balance and the corporate sector variables are instrumented. The models (3) and (4) include country fixed effects. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 4.A for a detailed description of the data.

Table 4.3: Current account regression model: pre-crisis sample and financial crisis dummy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regressor	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*
L.Net foreign assets (% of GDP)	0.051***	0.044***	0.048***	0.049***	0.040***	0.039***	0.040***	0.039***
	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.078***	-0.071***	-0.075***	-0.080***	-0.061***	-0.058***	-0.061***	-0.059***
	(0.018)	(0.018)	(0.019)	(0.018)	(0.015)	(0.015)	(0.015)	(0.015)
L.Output per worker (relative to top 3 economies)	-0.026	0.000	-0.009	-0.012	-0.019	-0.011	-0.019	-0.010
	(0.021)	(0.023)	(0.023)	(0.022)	(0.020)	(0.021)	(0.021)	(0.021)
L.Relative output per worker × Capital openness	0.109***	0.091***	0.105***	0.099***	0.087***	0.081***	0.085***	0.079***
	(0.026)	(0.029)	(0.028)	(0.027)	(0.026)	(0.026)	(0.026)	(0.026)
Dependency ratio	-0.133***	-0.128**	-0.136***	-0.132***	-0.082*	-0.072*	-0.076*	-0.069*
	(0.048)	(0.054)	(0.051)	(0.048)	(0.042)	(0.041)	(0.042)	(0.041)
Population growth	-1.954***	-1.881***	-1.971***	-1.912***	-1.798***	-1.687***	-1.793***	-1.654***
	(0.470)	(0.524)	(0.500)	(0.466)	(0.481)	(0.478)	(0.482)	(0.479)
Financial center status	0.010	0.014	0.015*	0.009	0.022**	0.022**	0.023**	0.022**
	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)
Institutional/political environment	-0.028	-0.028	-0.025	-0.024	-0.034	-0.029	-0.033	-0.029
	(0.023)	(0.024)	(0.024)	(0.023)	(0.022)	(0.022)	(0.022)	(0.022)
Reserve currency status	-0.033***	-0.027**	-0.036***	-0.030***	-0.029***	-0.026**	-0.028***	-0.026**
	(0.010)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)
Private credit (% of GDP)	-0.040***	-0.039***	-0.043***	-0.037***	-0.026***	-0.023***	-0.025***	-0.023***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)
Output gap	-0.430***	-0.447***	-0.421***	-0.430***	-0.318***	-0.327***	-0.318***	-0.326***
	(0.066)	(0.067)	(0.068)	(0.068)	(0.053)	(0.055)	(0.053)	(0.055)
Terms of trade gap × Trade openness	0.334***	0.346***	0.334***	0.339***	0.310***	0.313***	0.304***	0.311***
	(0.052)	(0.051)	(0.051)	(0.052)	(0.040)	(0.041)	(0.041)	(0.041)
L.Cyclically-adjusted fiscal balance (% of GDP)	0.242***	0.163***	0.178***	0.192***	0.213***	0.161***	0.220***	0.161***
	(0.046)	(0.044)	(0.044)	(0.044)	(0.040)	(0.037)	(0.040)	(0.037)
L.Cyclically-adjusted corporate balance (% of GDP)	0.164***	-	-	-	0.144***	-	0.120***	-
	(0.045)				(0.041)		(0.041)	
L.Corporate saving (% of GDP)	-	0.170***	-	0.215***	-	0.203***	-	0.192***
		(0.050)		(0.050)		(0.049)		(0.049)
L.Corporate investment (% of GDP)	-	-	-0.005	-0.089	-	-0.091*	-	-0.074
			(0.056)	(0.058)		(0.052)		(0.052)
Financial crisis dummy	-	-	-	-	-0.000	0.000	-0.003	-0.003
					(0.003)	(0.003)	(0.003)	(0.003)
L.Cyclically-adjusted corporate balance (% of GDP) × Crisis dummy	-	-	-	-	-0.059	-	0.022	-
					(0.053)		(0.064)	
L.Corporate saving (% of GDP) × Crisis dummy	-	-	-	-	-	-0.062	-	-0.024
						(0.062)		(0.072)
L.Corporate investment (% of GDP) × Crisis dummy	-	-	-	-	-	0.089	-	0.022
						(0.064)		(0.073)
Observations	506	506	506	506	706	706	706	706
Countries	25	25	25	25	25	25	25	25
R-squared	0.670	0.649	0.626	0.670	0.668	0.671	0.667	0.667
RMSE	0.027	0.028	0.029	0.027	0.028	0.027	0.028	0.028

Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parentheses. The models (1)-(4) are estimated for the period 1980-2007. The models (5)-(8) include a dummy variable for the global financial crisis or for systemic banking crisis. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 4.A for a detailed description of the data.

pooled GLS, excluding only the high-investment surplus economies China and South Korea (Table 4.2, Columns 5-8). Corporate investment now turns out to have a statistically significant effect on the current account.

The estimations reported in Columns 9-10 include net FDI flows as an additional regressor to capture the increasingly important role of global firms as a possible explanation for the link between corporate net lending and the current account. Although tracking the international footprints of global firms in terms of the implications of their foreign portfolio and direct investment strategies (Avdjiev et al., 2018) as well off-shore activities (Alstadsæter et al., 2018) are a complex issue that can only be (partially) addressed using firm-level micro data, a feasible robustness check in a macro panel framework is to control for net FDI flows in the current account estimations. As can bee seen in Columns 9-10 of Table 4.2, the estimated coefficients on the corporate sector variables remain virtually unchanged, compared with the models from Columns 2 and 5 in Table 4.1, even when net FDI flows are added to the models.

Is the corporate veil effect a temporary crisis phenomenon?

We also address the question of whether the corporate veil thickened as a result of the global financial crisis after 2007. This hypothesis is intuitively appealing because individual shareholders may discount the value of profits retained by the corporations of which they are the owners in an environment of uncertain future sales and profit opportunities, higher bankruptcy risk and increased likelihood of a stock market downturn. As a result, shareholders' consumption may be less sensitive to corporate retained profits in times of crisis than in normal times, when shareholders have a clearer perception of their permanent income which in part stems from claims on corporate saving.

The results reported in Table 4.3 do not support such a hypothesis, however. In Columns 1-4, the current account models including the corporate sector variables are estimated for the period 1980-2007. If anything, the effects of corporate net lending and corporate saving on the current account are stronger for the pre-crisis sample than for the full sample (Columns 2-5 of Table 4.1).

Similarly, when the corporate sector variables are interacted with two different crisis dummies in estimations over the full sample period, the estimated coefficients on these interaction terms are quantitatively negligible and statistically insignificant. In Columns 5-6 of Table 4.3, we include a dummy variable for the global financial crisis, which takes a value of one for the years 2008-2012, in the regression model. Focusing on this particular crisis is warranted by the particular depth of the Great Recession and its global repercussions. In Columns 7-8, we use a dummy variable for country-specific systemic banking crises, based on Laeven and Valencia (2018). Including this banking crisis dummy provides a more general test of a crisis-induced thickening of the corporate veil. How-

Table 4.4: Current account regression model: inequality

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regressor	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*	*CA*
L.Net foreign assets (% of GDP)	0.047***	0.047***	0.047***	0.040***	0.046***	0.047***	0.046***	0.041***
	(0.007)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.008)	(0.006)
L.NFA/Y × (Dummy if NFA/Y < -60%)	-0.068***	-0.069***	-0.069***	-0.064***	-0.068***	-0.068***	-0.067***	-0.063***
	(0.017)	(0.017)	(0.017)	(0.014)	(0.017)	(0.017)	(0.018)	(0.014)
L.Output per worker (relative to top 3 economies)	-0.022	-0.021	-0.020	-0.023	-0.015	-0.015	-0.012	-0.017
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
L.Relative output per worker × Capital openness	0.096***	0.090***	0.089***	0.085***	0.090***	0.086***	0.083***	0.083***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)
Dependency ratio	-0.119**	-0.124***	-0.122***	-0.067*	-0.110**	-0.116**	-0.111**	-0.068*
	(0.047)	(0.047)	(0.046)	(0.039)	(0.047)	(0.047)	(0.046)	(0.039)
Population growth	-1.770***	-1.728***	-1.895***	-1.625***	-1.648***	-1.616***	-1.769***	-1.571***
	(0.475)	(0.476)	(0.485)	(0.471)	(0.469)	(0.468)	(0.479)	(0.462)
Financial center status	0.016*	0.016*	0.017*	0.021**	0.015*	0.015*	0.016*	0.019**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)
Institutional/political environment	-0.020	-0.021	-0.019	-0.034	-0.016	-0.017	-0.014	-0.030
	(0.022)	(0.022)	(0.022)	(0.021)	(0.022)	(0.022)	(0.022)	(0.021)
Reserve currency status	-0.020*	-0.019*	-0.020*	-0.025**	-0.019*	-0.018*	-0.018*	-0.026**
	(0.011)	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)	(0.010)
Private credit (% of GDP)	-0.025***	-0.025***	-0.024***	-0.025***	-0.023***	-0.023***	-0.022***	-0.023***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Output gap	-0.306***	-0.306***	-0.297***	-0.322***	-0.312***	-0.310***	-0.304***	-0.319***
	(0.054)	(0.054)	(0.057)	(0.053)	(0.056)	(0.056)	(0.058)	(0.055)
Terms of trade gap × Trade openness	0.301***	0.299***	0.299***	0.303***	0.305***	0.304***	0.304***	0.309***
	(0.043)	(0.043)	(0.043)	(0.041)	(0.043)	(0.043)	(0.044)	(0.041)
L.Cyclically-adjusted fiscal balance (% of GDP)	0.224***	0.226***	0.249***	0.226***	0.179***	0.180***	0.195***	0.167***
	(0.043)	(0.042)	(0.043)	(0.040)	(0.039)	(0.039)	(0.040)	(0.037)
L.Cyclically-adjusted corporate balance (% of GDP)	0.115***	0.118***	0.128***	0.148***	-	-	-	-
	(0.041)	(0.041)	(0.042)	(0.039)				
L.Corporate saving (% of GDP)	-	-	-	-	0.177***	0.179***	0.192***	0.192***
					(0.050)	(0.050)	(0.050)	(0.048)
L.Corporate investment (% of GDP)	-	-	-	-	-0.078	-0.087	-0.083	-0.124**
					(0.052)	(0.053)	(0.056)	(0.054)
L.Top 1% income share	-0.133**	-	-	-	-0.121**	-	-	-
	(0.057)				(0.058)			
L.Top 5% income share	-	-0.101***	-	-	-	-0.094**	-	-
		(0.039)				(0.041)		
L.Top 10% income share	-	-	-0.068**	-	-	-	-0.064*	-
			(0.033)				(0.034)	
L.Gini coefficient	-	-	-	-0.087**	-	-	-	-0.076*
				(0.037)				(0.040)
Observations	656	656	633	706	656	656	633	706
Countries	25	25	25	25	25	25	25	25
R-squared	0.670	0.691	0.694	0.684	0.694	0.693	0.695	0.682
RMSE	0.027	0.026	0.026	0.027	0.026	0.026	0.026	0.027

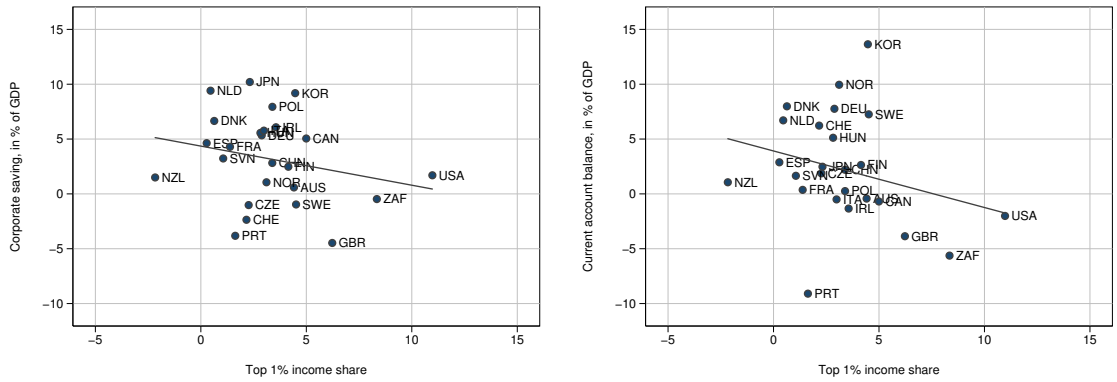
Notes: CA is the current account balance in % of GDP. All regressions are estimated by pooled GLS with a panel-wide AR(1) correction. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 4.A for a detailed description of the data.

ever, the results of the different specifications shown in Table 4.3 suggest that the current account effects of the corporate sector cannot be explained as a temporary crisis phenomenon.

Is the corporate saving effect due to income inequality?

Finally, we can use our current account estimations for clarifying the relationship between corporate saving and household income inequality. Dao and Maggi (2018) argue that the observed positive link between corporate saving and the current account should not be surprising since higher corporate saving reinforced rising wealth inequality and hence did not give rise to proportionately higher aggregate household consumption.

Figure 4.8: Top household income shares, corporate saving, and current account balances



Notes: The figure shows the change in the top 1% household income share (horizontal axis) against, respectively, the change in corporate saving in % of GDP and the current account balance in % of GDP (vertical axis). Changes are calculated for the period 1980/83-2012/15 or for the longest time span within this period.

However, as can be seen in Figure 4.8, the cross-country correlation of changes in corporate saving and changes in top-end personal income inequality is actually negative in our sample. Moreover, changes in the top 1% household income share are negatively correlated with changes in national current account balances, in contrast with the positive correlation between changes in corporate saving and changes in current account balances (see Figures 4.8 and 4.6).

In Table 4.4, we show estimation models including both the corporate sector variables and different measures of personal income inequality. While the corporate veil effects are robust to this extension of the model, household income inequality is found to have a consistently negative effect on the current account. Although this result may seem counterintuitive, it is consistent with empirical evidence pointing at a negative effect of (top-end) income inequality on household and national saving ("trickle-down consumption"). Bertrand and Morse (2016), for example, based on 1980-2008 expenditure data from the Consumer Expenditure Survey (CEX), show that non-rich households in the

United States consumed a larger share of their current income when exposed to higher top income and consumption levels. Theoretically, this finding is consistent with consumption externalities arising from a status-maintaining motive by middle and lower class households (see also Frank, 2007; Heffetz, 2011; Frank et al., 2014; Agarwal et al., 2018). Bertrand and Morse (2016) conclude that the U.S. personal saving rate in 2005, which was 1.5%, would have been between 3.5% and 3.9% if top income levels had grown at the same rate as the median income since the 1980s. Kumhof et al. (2012) and Behringer and van Treeck (2018) obtain similar results in macro panel estimation analyses of current account balances.

How is the finding of a negative current account effect of household income inequality to be squared with the positive effect of corporate saving? Although the present analysis does not allow any definite conclusions, a potential explanation follows directly from the combined notions of trickle-down consumption and corporate veil: Trickle-down consumption effects are triggered by higher spending by high-income households on positional goods, to which lower-income households react by trading off (non-positional) saving for (positional) consumption. Without a corporate veil, an increase in corporate saving should have the same consumption and saving effects as an increase in top household incomes. However, in the presence of a corporate veil, trickle-down consumption effects will be smaller in countries where corporate saving increases more strongly, but where top-end household income inequality increases less strongly. As Figure 4.8 suggests, changes in corporate saving and top household income shares tend to be inversely related across countries, since a high level of retained corporate sector profits in surplus countries such as Germany, Japan, the Netherlands, or South Korea implies a lower level of top executive incomes and dividend income in the household sector. Conversely, higher distributed profits and top management pay in such deficit countries as the United Kingdom or the United States imply lower corporate retained earnings.

4.5 Concluding remarks

Recent academic and policy-oriented debates have highlighted the importance of corporate sector behavior as a driving force of macroeconomic trends (Gruber and Kamin, 2016; Chen et al., 2017; IMF, 2017*a*; Dao and Maggi, 2018). This emerging strand in the literature constitutes a departure from the long dominant individualistic foundations of theoretical and empirical macroeconomics. The present chapter contributes to these debates by analyzing the role of the corporate sector in global current account imbalances. While the intertemporal approach to the current account that has dominated the literature since the seminal contribution by Obstfeld and Rogoff (1995) highlights the importance of individual optimizing behavior for national saving-investment balances, our chapter adds

to the increasing recognition of the non-household sectors as shaping macroeconomic dynamics beyond the control of decisions made in the household sector.[10] While the existing empirical literature has routinely tested for non-Ricardian household behavior by including the fiscal balance as an explanatory variable in current account regressions, we have argued in this chapter that corporate sector behavior ought to take center stage in the analysis of global current account imbalances.

The most significant and robust result of this chapter is that changes in corporate saving have statistically and economically significant explanatory power for the understanding of national current account dynamics. This finding is robust to controlling for country-specific effects, FDI flows, temporary crisis effects, and personal income inequality. At a theoretical basis, it is consistent with incomplete piercing of the corporate veil.

The recent convergence of the macroeconomics literature and the literature on income and wealth inequality in terms of the implications of corporate sector trends for both aggregate demand dynamics and distributional dynamics (e.g. Karabarbounis and Neiman, 2014; Zucman, 2014; Autor et al., 2017; Chen et al., 2017; Piketty et al., 2018) entails promising avenues for future research. On the one hand, as our empirical analysis shows, the current account effects of changes in distribution may differ considerably across countries depending on the extent to which they affect either personal income inequality or corporate saving and wealth inequality. On the other hand, the growing prevalence of globally operating firms poses important challenges to conventional analyses of both income and wealth inequality measures and current account determinants. National current account balances are increasingly driven by the decisions of multinational firms in a context of global value chains and international tax optimization strategies, which interfere with intertemporal saving decisions by domestic households (e.g. Avdjiev et al., 2018). While the present chapter has highlighted the importance of corporate sector behavior in a macro panel estimation framework, an important task for future research is to analyze the macroeconomic implications of corporate sector behavior further using firm-level micro data.

[10] The focus on economic sectors as driving forces of macroeconomic outcomes has a long tradition in "structuralist" approaches to macroeconomics (see, for example, Godley and Lavoie, 2007).

Appendix to Chapter 4

4.A Description of data

Current account balance: The current account balance is defined as the sum of net exports of goods and services, net primary income, and net secondary income in percent of GDP. Data for the current account balance are taken from the World Economic Outlook (WEO) database (October 2018 version) provided by the International Monetary Fund (IMF).

Total investment: Gross capital formation is measured by the total value of gross fixed capital formation and changes in inventories and acquisitions less disposals of valuables in percent of GDP. Total saving is defined as the sum of the current account balance in percent of GDP and gross capital formation in percent of GDP. Data are taken from the World Economic Outlook (WEO) database (October 2018 version).

Household balance: The household financial balance is defined as gross saving minus gross capital formation and other capital expenditures in percent of GDP. Our primary source is the AMECO database (May 2018 version) of the European Commission. For China, Korea, New Zealand, and South Africa, we use data from the national accounts statistics provided by the Eurostat database. For Australia and Canada, we employ data from national statistical sources.

Net foreign assets: Net foreign assets are measured as total assets minus total liabilities in percent of GDP. In order to capture possible nonlinearities in the relationship between the current account and the net foreign asset position, we include an interaction term to allow for a different slope when the net foreign asset position is below negative 60 percent of GDP. Data are taken from the updated and extended version of the External Wealth of Nations Mark II database developed by Lane and Milesi-Ferretti (2018).

Financial center status: We follow the External Balance Assessment (EBA) methodology developed by Phillips et al. (2013) and include a dummy variable that equals one for small countries that are considered as financial centers. In our regression sample these countries are the Netherlands and Switzerland.

Output per worker, relative to top 3 economies: To measure a country's relative stage of economic development, we take the ratio of PPP converted GDP to working age population relative to the average productivity of three large economies (Germany, Japan, and the United States). We use GDP at PPPs in international dollars from the World Eco-

nomic Outlook (WEO) database (October 2018 version). Data on working age population are taken from the 2017 Revision of World Population Prospects provided by the United Nations. Relative output per worker is also interacted with an indicator for capital account openness. The degree of a country's capital account openness is measured by the capital controls index developed by Quinn (1997) and Quinn and Toyoda (2008). This index measures the magnitude of capital account liberalization and is scaled between 0 (no capital controls) and 1 (full capital controls).

Demographics: Demographic developments are proxied by the old-age dependency ratio, which is constructed as the ratio of the population older than 65 years to the population between 30 and 64, and population growth. Data are taken from the 2017 Revision of World Population Prospects.

Reserve currency status: We use the share of a country's own currency in the total stock of world reserves as a proxy for the so-called "exorbitant privilege" of reserve currency countries. Data are taken from the Currency Composition of Official Foreign Exchange Reserves (COFER) database provided by the IMF.

Output gap: The output gap is measured by the Hodrick-Prescott filter. This procedure removes the cyclical component from the long-term trend GDP. The HP filtered estimates of the output gap are based on data over 1980-2023, using projections for 2018-2023. Data are in constant national currency and taken from the World Economic Outlook (WEO) database (October 2018 version).

Terms of trade gap: The terms of trade are defined as the ratio between the index of export prices and the index of import prices. The terms of trade gap is measured by the Hodrick-Prescott filter based on data over the period 1970-2016. We employ data from the OECD National Accounts Statistics database. For China, we use data from the World Development Indicators (WDI) database (October 2018 version) provided by the World Bank. The resulting terms of trade gap series is then interacted with an indicator of a country's trade openness. Trade openness is measured as the sum of exports and imports of goods and services in percent of GDP. Data are taken from the World Development Indicators (WDI) database (October 2018 version).

Institutional and political environment: In our regressions, we use a measure of the degree of safety (or risk) associated with the institutional and political environment. This measure is a summary index of five indicators: socioeconomic conditions, investment profile, corruption, religious tensions and democratic accountability. Each indicator is scaled between 0 and 1 and the summary index is a simple average of the five sub-indices.

A safer (*i.e.* less risky) institutional and political environment is assigned higher ratings. Data are taken from the EBA dataset.

Private credit: We use private credit by deposit money banks and other financial institutions in percent of GDP as a proxy for both "financial excesses" and financial development. The variable measures the deviation form a country's current level of credit provided to households and non-financial corporations from its own historical average. Data are taken from the Global Financial Development Database (GFDD) provided by the World Bank (July 2018 version). For Canada and New Zealand, data are only available until 2008 and 2010. For the remaining period until 2015 we use the latest available observation.

Cyclically-adjusted fiscal balance: The fiscal balance is defined as total general government revenue minus total general government expenditures in percent of GDP. The cyclically-adjusted fiscal balance is computed as the residual of a regression of the fiscal balance on the output gap. We employ several sources for the fiscal balance. Our primary source is the AMECO database (May 2018 version) of the European Commission. As the Eurostat database and the OECD database provide longer series for certain countries, we complement the AMECO series with data from these alternative sources. For China, Korea, New Zealand, and South Africa, we use series from the Eurostat database. For Belgium, Denmark, Italy, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom, we employ data from the OECD database. For Australia and Canada, we employ data from national statistical sources.

Cyclically-adjusted corporate balance: The corporate financial balance is defined as gross saving minus gross capital formation and other capital expenditures in percent of GDP. The cyclically-adjusted corporate balance is computed as the residual of a regression of the corporate balance on the output gap. We employ several sources for the corporate balance. Our primary source is the AMECO database (May 2018 version) of the European Commission. For China, Korea, New Zealand, and South Africa, we use data from the national accounts statistics provided by the Eurostat database. For Australia and Canada, we employ data from national statistical sources.

Corporate saving and investment: Gross saving of the corporate sector is defined as disposable income minus adjustments for the change in net equity of households in pension funds reserves in percent of GDP. Gross capital formation of the corporate sector consists of gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables in percent of GDP. Our primary source is the AMECO database (May 2018 version) of the European Commission. For China, Korea, New Zealand, and South Africa,

we use data from the national accounts statistics provided by the Eurostat database. For Australia and Canada, we employ data from national statistical sources.

Foreign direct investment: We use net foreign direct investment flows in percent of GDP as a proxy of the corporate sector globalization process. Net foreign direct investment flows are defined as outward flows of foreign direct investment minus inward flows of foreign direct investment in percent of GDP. Data are taken from the United Nations Conference on Trade and Development (UNCTAD).

Economic crises: In order to examine whether the current account effects of corporate sector behavior are different during economic crises we add interaction terms between corporate sector variables and a variable for economic crises. For this purpose, we use a dummy variable for the global financial crisis that equals one over the period 2008-2012 for all countries in the sample. Alternatively, we use a dummy variable for banking crisis taken from the global database on systemic banking crises by Laeven and Valencia (2018). Our sample of 25 countries over the period 1980-2015 includes 26 banking crises episodes.

Top income shares: We use different top income share series of fiscal income from the World Inequality Database (WID) as proxies for income inequality. These data are collected from personal income tax returns following the methodology outlined in Piketty (2003) and Piketty and Saez (2003). For Ireland, data on top 5% income shares are not available. We therefore use the mean of the top 1% income share and the top 10% income share.

Gini coefficient: As an alternative measure of income inequality we use the Gini coefficient of equivalized market household income (*i.e.* before taxes and transfers) of the Standardized Income Inequality Database (SWIID, version 7.1). For a detailed description of the dataset, see Solt (2016).

4.B Demeaning of explanatory variables

Since national current account balances are influenced both by domestic and foreign economic conditions, most explanatory variables are converted into deviations from a weighted sample mean. The sample mean is calculated across all countries for which data are available for a given time period. Country-specific weighted averages of foreign variables are then constructed as follows:

$$\widetilde{X}_{it} = X_{it} - \frac{\sum_{i=1}^{J} (W_{it} \cdot X_{it})}{\sum_{i=1}^{J} W_{it}} \tag{4.7}$$

where X_{it} denotes the observation of the respective explanatory variable for country i and time period t, and W_{it} stands for the weighting variable. For country-specific GDP weights we use data from the World Economic Outlook (WEO) database (October 2018 version) provided by the International Monetary Fund (IMF).

Chapter 5

Factor shares and the rise in corporate net lending[1]

5.1 Introduction

In this chapter, we analyze how changes in factor shares affect corporate saving and investment behavior. Over the past decades, the corporate sector has turned from a net borrowing position to a net lending position in major advanced countries (e.g. Chen et al., 2017; Dao and Maggi, 2018). This phenomenon, which has gained growing attention in the aftermath of the Great Recession of 2008, is rather unusual as corporations had historically borrowed funds from other sectors in the economy to finance their investment spending. It has also been noted that corporate sector behavior plays an important role in accounting for current account differentials in the recent past (IMF, 2017*a*, 2019*a*). In a number of countries with large and persistent current account surpluses, such as Germany, Japan, the Netherlands, or South Korea, the corporate sector has recorded high and rising financial surpluses already before the Great Recession. By contrast, major current account deficit countries, such as the United Kingdom or the United States, exhibit no, or less pronounced upward trends in corporate net lending, at least prior to the Great Recession. Given that corporate sector behavior plays a key role for national current account dynamics (Behringer and van Treeck, 2018), it is increasingly important to understand the drivers of corporate net lending.

In recent years, there has also been a revival of interest among economists in the evolution of factor shares and its macroeconomic implications. While there is consensus about the declining labor share of income in most countries since the early 1980s, the main question of controversy is whether this decline can be interpreted as largely an equilibrium outcome resulting from competitive forces such as technological change and a decrease in the relative price of capital, or as the result of non-competitive developments such as rising market power. The answer to this question is also relevant to the analysis of the macroeconomic implications of changes in factor shares including corporate sector trends.

How does the increase in corporate net lending relate to changes in the distribution of

[1] An earlier version of this chapter was published as "Factor shares and the rise in corporate net lending", FMM Working Paper 53-2020, see Behringer (2020).

income between wages and profits? The effects of changes in factor shares on corporate saving and investment, and hence the corporate financial balance, are theoretically ambiguous. An increase in the profit share has a positive effect on corporate saving if these additional resources are retained within the corporate sector rather than distributed to shareholders in the form of dividends. But if a higher profit share is also accompanied by higher investment, the corporate financial balance may remain unaffected or even decrease. Chen et al. (2017), in a recent contribution, stress the role of changes in the cost of capital for the link between factor shares and trends in the corporate sector. They develop a dynamic general equilibrium model with heterogeneous firms in which capital market imperfections imply that firms prefer to finance investment projects with internal saving rather than with external funds. In response to a reduction in the cost of capital, firms substitute away from labor and toward capital to such an extent that the labor share declines and corporate profits increase. Given the stability of dividend payments, the increase in profits leads to an increase in corporate saving. While interesting, Chen et al. (2017) are not able to explain the improvement in the net lending position of the corporate sector because the decline in the cost of capital also generates an increase in the investment rate in their model. However, investment booms are difficult to find in the data for the pre-crisis period. On the contrary, as argued by Gutiérrez and Philippon (2017*b*) for the case of the United States, the phenomenon of "investmentless growth" during the past two decades or so may, in fact, be related to decreased competition leading to both increasing markups and lower investment. Similarly, IMF (2019*b*) present tentative firm-level evidence that the rise in the corporate saving rate is closely linked to increased concentration in corporate sales and assets, which has occurred alongside rising markups and profitability.[2]

The contribution of the present chapter is to analyze the corporate balance effects of changes in the distribution of income between wages and profits for a sample of 40, mainly industrialized, countries for the period 1990-2016. We also inquire into the functional chains linking the functional income distribution and the corporate financial balance and examine whether changes in the profit share affect primarily corporate saving or investment. One important challenge is to identify the underlying mechanism through which the profit share may affect the corporate financial balance. We test the relevance of the cost of capital hypothesis empirically and examine whether changes in the relative price of investment goods, corporate income taxes, and the real interest rate have contributed to an increase in corporate saving above investment. Moreover, we consider the possibility that the link between the profit share and the corporate financial balance reflects long-term changes in the structure of the economy. Firstly, the relative contribution

[2]See Autor et al. (2017, 2020), Grullon et al. (2019), and Barkai (2020) for evidence of rising concentration; see De Loecker and Eeckhout (2018), De Loecker et al. (2020), and Diez et al. (2018) for evidence of rising markups.

of the manufacturing sector to GDP has declined in most advanced countries over the past decades, whereas the share of GDP accounted for by services experienced a sharp increase. This change in the composition of industrial sectors could have led to a decline in the wage share and an increase in the profit share. Moreover, the shift from manufacturing toward services may have also affected the corporate financial balance because financial constraints tend to be more severe for services than for manufacturing firms. Secondly, the corporate balance effects of the profit share may be associated with shifts in the composition of investment toward intangible assets. On the one hand, an increase in the share of intangible capital could lead to an increase in profits through competitive payments for intangible services and a decrease in (measured) investment, a possibility discussed by Gutiérrez and Philippon (2017*a*). On the other hand, the shift toward more investment in intangible capital may also contribute to higher corporate saving. Falato et al. (2013) suggest that corporations with a high share of intangibles need to accumulate internal funds as intangible capital cannot be pledged as collateral to raise external financing. Finally, we ask whether the pattern of the corporate financial balance has changed significantly during the Great Recession. In most countries, the corporate balance positions have increased strongly since the global financial crisis, reflecting both increases in corporate saving and declines in corporate investment. Gruber and Kamin (2016) discuss the possibility that the global financial crisis caused a structural break in corporate sector behavior, possibly due to a persistently raised level of uncertainty about future demand or fundamentally changed requirements of corporations to initiate investment projects.

Our main findings are as follows: Firstly, we find significant effects of changes in the profit share on the corporate financial balance, controlling for other determinants of the corporate financial balance. There is also evidence that the profit share affects the corporate financial balance mainly through its positive effect on corporate saving whereas the effect on corporate investment is found to be very limited. This implies that an increase in profits raises corporate saving more than investment. The effects of the profit share on the corporate financial balance and its components are robust throughout our various specifications. Accounting for variations in the profit share contributes considerably to understanding changes in the corporate financial balance, especially during the period running up to the global financial crisis. Secondly, the effects of the profit share on corporate saving are unlikely to be the reflection of a substitution away from labor and toward capital arising from a decline in the cost of capital. Our results rather suggest that other factors, such as rising corporate market power, may contribute to explaining the observed trends in the profit share and the corporate financial balance. Thirdly, the effects of the profit share are robust for the non-financial corporate sector and persist when we control for shifts in the sectoral composition of economic production and the growing importance of intangible capital. Finally, we do not find evidence that the corporate

sector behavior has changed significantly as a result of the global financial crisis starting in 2007. Since the wake of the crisis, global corporate net lending has reached a historical high, but in most countries the pattern rather follows a secular trend and thus cannot be explained by a temporary crisis phenomenon.

The remainder of the chapter is structured as follows. In Section 5.2, we review the theoretical and empirical literature on the determinants of corporate sector behavior. Section 5.3 discusses important stylized facts about trends in the corporate financial balance and its components, sectoral financial balances, and the sources and uses of the corporate financial balance. Section 5.4 presents the empirical analysis. Section 5.5 concludes.

5.2 Literature review

The contribution of this chapter is to analyze the implications of changes in factor shares for trends in the corporate sector within a panel estimation analysis. It builds on two strands in the literature. Firstly, our work is related to a number of studies that analyze the determinants of corporate net lending but so far have not addressed the role of factor shares in a rigorous fashion. Secondly, there is an emerging literature, based on sector-level and firm-level data, documenting a decline in the labor share of income across countries in recent decades.

5.2.1 Determinants of corporate sector behavior

Although recent academic and policy-oriented debates have noted the importance of corporate sector behavior as a driving force of macroeconomic trends (e.g. Gruber and Kamin, 2016; IMF, 2017*a*, 2019*a*; Dao and Maggi, 2018; Behringer and van Treeck, 2019*a*), the literature on the potential determinants of corporate net lending is still relatively scarce.

One of the first descriptions of corporate sector behavior with a view to understanding the main factors behind trends in corporate saving and investment is provided by IMF (2006). They demonstrate, based on national accounts data, that the levels of corporate net lending increased substantially in most G7 countries in the early 2000s and ask whether the upward trend is a temporary or more permanent phenomenon. Moreover, they attribute the rise in corporate net lending to a number of factors, including lower tax and interest payments that improved corporate profitability and the decline in the relative price of investment goods that lowered investment spending. Similarly, André et al. (2007) analyze the drivers of corporate sector behavior in OECD countries. While confirming the findings by IMF (2006), they also emphasize the importance of cyclical and financial effects for the rise in corporate net lending in the early 2000s. Both IMF (2006) and André et al. (2007) conclude that the corporate net lending positions would likely de-

cline if investment spending recovers and the process of deleveraging is completed. This scenario, however, has not materialized and corporate net lending has increased further in most countries in recent years.

Gruber and Kamin (2016) focus on the rise in corporate net lending in the aftermath of the global financial crisis. They estimate standard investment equations for a sample of OECD countries for the period 1995-2008 and compare out-of-sample forecasts of these models with actual real investment spending to assess whether the relationship between investment and its fundamental determinants has shifted since the crisis. Their results suggest that the post-crisis weakness in investment spending was largely in line with fundamentals and thus most likely reflects an endogenous response to the macroeconomic disruptions associated with the global financial crisis. They conclude, therefore, that the rise in corporate net lending does not appear to reveal a shift in corporate (investment) behavior relative to past norms. The analysis by Gruber and Kamin (2016) focuses exclusively on the factors behind the decline in investment spending after the global financial crisis. In a number of advanced countries, however, corporate net lending started to rise far before the global financial crisis. This naturally raises the question as to whether the underlying causes of the increase in corporate net lending are a combination of both temporary and structural factors. Moreover, the rise in corporate net lending prior to the global financial crisis cannot be attributed to a decline in investment spending but is rather due to a long-term upward trend in corporate saving.

Dao and Maggi (2018) provide a detailed descriptive analysis of trends in corporate sector behavior using both cross-country national accounts and firm-level data.[3] They show that the rise in corporate net lending is a pervasive phenomenon across major industrialized countries over the last two decades, although most pronounced in countries with persistent current account surpluses. Moreover, they find that the trend towards higher corporate saving is concentrated among large firms, driven by rising profitability, lower financing costs, and reduced tax rates. Dao and Maggi (2018) also study the relationship between corporate net lending and cash holdings and argue that the motives for the rise in cash holdings are likely to play an important role in driving corporate saving and net lending.[4] While the combination of national accounts and firm-level data certainly contributes to a better understanding of the main trends in corporate sector behavior, the analysis by Dao and Maggi (2018) remains largely inconclusive with regard to the fundamental causes for the rise in corporate net lending.

[3] A few studies have approached the issue of corporate sector behavior with a focus on specific countries or groups of countries. Armenter and Hnatkovska (2017) emphasize the link between taxes and the accumulation of net financial assets of the U.S. non-financial corporate sector in the 2000s due to a precautionary motive. Bacchetta and Benhima (2015) and Fan and Kalemli-Özcan (2016) study the relationship between corporate saving and financial frictions in emerging countries.

[4] The determinants of the rise in cash holdings, especially by U.S. firms, have been extensively discussed in the corporate finance literature (see, e.g., Opler et al., 1999; Foley et al., 2007; Bates et al., 2009; Falato et al., 2013).

5.2.2 Factor shares and corporate sector behavior

In recent years, there has been renewed interest in the evolution of factor shares and its determinants (e.g. Elsby et al., 2013; Karabarbounis and Neiman, 2014; Piketty, 2014; Rognlie, 2015; Autor et al., 2017, 2020; Dao et al., 2017; Koh et al., 2018; Barkai, 2020). However, this literature has developed rather independently of the literature on corporate sector behavior, and few attempts have been made at analyzing the link between factor shares and corporate net lending in a systematic fashion.

At the theoretical level, the effects of changes in the distribution between wages and profits on corporate saving and investment, and hence the corporate financial balance, are ambiguous. An increase in the profit share has a positive effect on corporate saving if dividend payments do not fully absorb the rise in corporate profits. However, if a higher profit share also leads to an increase in investment activity, the corporate financial balance may remain unchanged or even decrease.

Chen et al. (2017) relate trends in factor shares and corporate saving to the decline in the cost of capital. They develop a dynamic general equilibrium model in which capital market imperfections lead firms to finance investment projects with internal saving rather than with external funds. In response to a reduction in the cost of capital, the model generates an increase in corporate saving above corporate investment. According to Chen et al. (2017), the most important drivers of this change are the global declines in the real interest rate, the price of investment goods, and corporate income taxes. The mechanism is that, with an elasticity of substitution above one in production, the decline in the cost of capital leads to a decline in the labor share and an increase in corporate profits. Given the stability of dividend payments, the increase in profits leads to an increase in corporate saving.

While interesting, the model does not square well with a number of empirical observations. Firstly, the improvement in the corporate net lending position is significantly underestimated as the model also generates an increase in the investment rate in response to a decline in the cost of capital. However, investment booms are difficult to find in the data for advanced economies in recent decades. Moreover, Gruber and Kamin (2016) find a positive effect of the cost of capital on investment for a sample of OECD countries, although the estimated effect is small. Similarly, Sajedi and Thwaites (2016) present cross-country evidence showing that investment rates are positively related to the relative price of investment goods. Secondly, in the empirical calibration of the model, the parameters are proxied to represent global trends since the beginning of the 1980s. The authors, however, do not systematically examine cross-country differences in the cost of capital and their implications for the evolution of factor shares and corporate net lending. For instance, the relative price of investment goods has declined relatively strongly in the United Kingdom and the United States where the profit share and corporate sav-

ing increased less. By contrast, in Germany or Japan, corporate profits and corporate saving have increased more substantially while the decline in the relative price of investment goods has been relatively minor. Gutiérrez and Philippon (2017*a*,*b*) offer an alternative explanation of the relationship between profit shares and corporate investment for the United States. Decreasing competition may lead to both, higher markups and profit shares on the one hand, and lower investment on the other hand. Generally speaking, even although the potential importance of changes in factor shares for macroeconomic trends has been recognized in the literature, the implications of factor shares for corporate net lending has not been systematically analyzed within a macro panel analysis.

5.3 The data

This Section documents a number of stylized facts about trends in the corporate sector. We focus primarily on the G7 economies and China. These eight countries accounted for more than 60% of global GDP during the last decade.

5.3.1 The evolution of corporate net lending

Figure 5.1: Saving, investment, and financial balance, corporate sector, G7

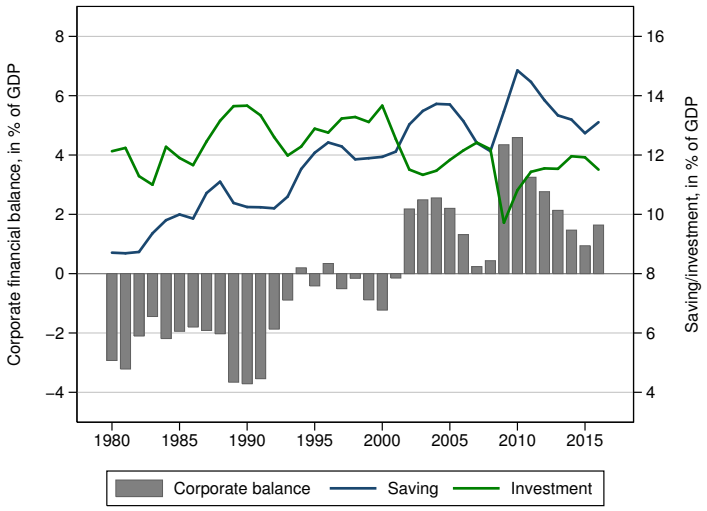


Figure 5.1 presents the development of GDP-weighted averages of corporate saving, investment and net lending for the G7 countries for the period 1980-2016.[5] All variables are converted into U.S. dollars using market exchange rates for the respective year. Since

[5]Figure 5.1 excludes China because it is a clear outlier both in terms of the corporate saving-to-GDP ratio and the corporate investment-to-GDP ratio; see Figure 5.2.

Table 5.1: Trends in the corporate balance, saving, and investment

	(1)	(2)	(3)	(4)	(5)	(6)
PANEL A: Corporate financial balance in % of GDP						
Trend	0.178**	0.175**	0.150***	0.163***	0.154***	0.135***
	(0.053)	(0.054)	(0.040)	(0.033)	(0.032)	(0.030)
Trend × GFC dummy	-	0.000	-	-	0.000	-
		(0.000)			(0.000)	
L.Real GDP growth	-	-	-0.452**	-	-	-0.443***
			(0.187)			(0.064)
Adj. R-squared	0.322	0.320	0.388	0.125	0.126	0.244
PANEL B: Corporate saving in % of GDP						
Trend	0.161***	0.159**	0.160***	0.147***	0.146***	0.146***
	(0.046)	(0.048)	(0.042)	(0.028)	(0.028)	(0.028)
Trend × GFC dummy	-	0.000	-	-	0.000	-
		(0.000)			(0.000)	
L.Real GDP growth	-	-	-0.020	-	-	-0.018
			(0.135)			(0.067)
Adj. R-squared	0.428	0.427	0.426	0.171	0.170	0.170
PANEL C: Corporate investment in % of GDP						
Trend	-0.029	-0.026	-0.008	-0.030	-0.023	-0.006
	(0.025)	(0.024)	(0.028)	(0.018)	(0.017)	(0.017)
Trend × GFC dummy	-	-0.000	-	-	-0.000	-
		(0.000)			(0.000)	
L.Real GDP growth	-	-	0.326***	-	-	0.372***
			(0.062)			(0.028)
Adj. R-squared	0.036	0.034	0.195	0.010	0.013	0.234
Observations	276	276	276	1057	1057	1057
Countries	8	8	8	40	40	40

Notes: All regressions are estimated by OLS and include country fixed effects. Standard errors in parantheses are corrected for heteroskedasticity and autocorrelation of the error term. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 5.A for a detailed description of the data.

the 1980s, the corporate sector of the G7 countries has turned from a net borrowing position to a net lending position. The rise in corporate net lending seems to be driven primarily by a long-term upward trend in corporate saving in percent of GDP. By contrast, the investment ratio has remained relatively stable over the period 1980-2007. After the outbreak of the global financial crisis, investment spending in percent of GDP declined sharply which has contributed to the high level of the corporate financial balance.

We further examine the presence of trends by regressing the corporate financial balance, saving, and investment against a linear time trend. The analysis is performed for a sample of G7 countries and China and for the full sample of 40 countries over the period 1980-2016 (Table 5.1). Columns 1 and 4 of Panel A show that the estimated coefficient on the linear trend in the corporate financial balance is statistically significant and of positive sign both for the sample of G7 countries and China and the full sample. The upward trend in the corporate financial balance was largely driven by a positive trend in the corporate saving ratio (Columns 1 and 4 of Panel B). The estimated coefficient on the linear

trend in the corporate investment ratio is slightly negative but statistically insignificant (Columns 1 and 4 of Panel C). We also test for differential effects in the corporate financial balance and its components during the Great Recession using an interaction term between the linear trend and a dummy variable which takes a value of one for the years 2008-2012. The results in Columns 2 and 5 of Panel C suggest a slightly negative trend in the corporate investment ratio during the Great Recession. The coefficients on the interactions terms are, however, quantitatively negligible and statistically insignificant. The positive trends in the corporate saving and the financial balance remain unchanged during the Great Recession. As a further robustness check, we include real GDP growth to capture business cycle effects. The results are generally robust to the inclusion of real GDP growth. Columns 3 and 6 of Panel A show that the corporate financial balance fluctuates with the business cycle and this largely reflects variations in investment spending (Columns 3 and 6 of Panel C). The corporate saving ratio, by contrast, is not significantly affected by the business cycle (Columns 3 and 6 of Panel B).

Although the aggregate corporate financial balance of the G7 countries increased strongly since the 1980s, the variation across countries was considerable. Figure 5.2 shows that Germany, Italy, Japan, and to a lesser extent Canada experienced a secular upward trend in the corporate financial balance since the 1980s, driven by a rise in corporate saving. In France and the United Kingdom, the corporate financial balance exhibits cyclical variations which are less clearly determined by corporate saving. The United States show no clear trend over time in the corporate financial balance prior to the global financial crisis. During the Great Recession, however, the corporate financial balance was at a historical level due to a rise in corporate saving and a fall in corporate investment. In China, the corporate sector is in a net borrowing position since the early 1990s but shows pronounced swings in corporate saving and investment.

5.3.2 Corporate net lending and current account balances

In the period leading up to the global financial crisis starting in 2007, the current account positions of a number of large countries have widened considerably. The United Kingdom and the United States, in particular, have recorded large and persistent current account deficits prior to the financial crisis. These current account deficits were matched by large current account surpluses in Japan, Germany, and China. By definition, the current account balance is the sum of the financial balances of the household sector, the corporate sector, and the government sector.

Figure 5.3 shows sectoral contributions to the current account balances for the G7 countries and China for the period 1980-2016. As can be seen from the Figure, the pattern of corporate sector behavior toward higher saving is an important distinguishing feature between surplus and deficit countries. In current account surplus countries, most notably

Figure 5.2: Saving, investment, and financial balance, corporate sector, G7 and China

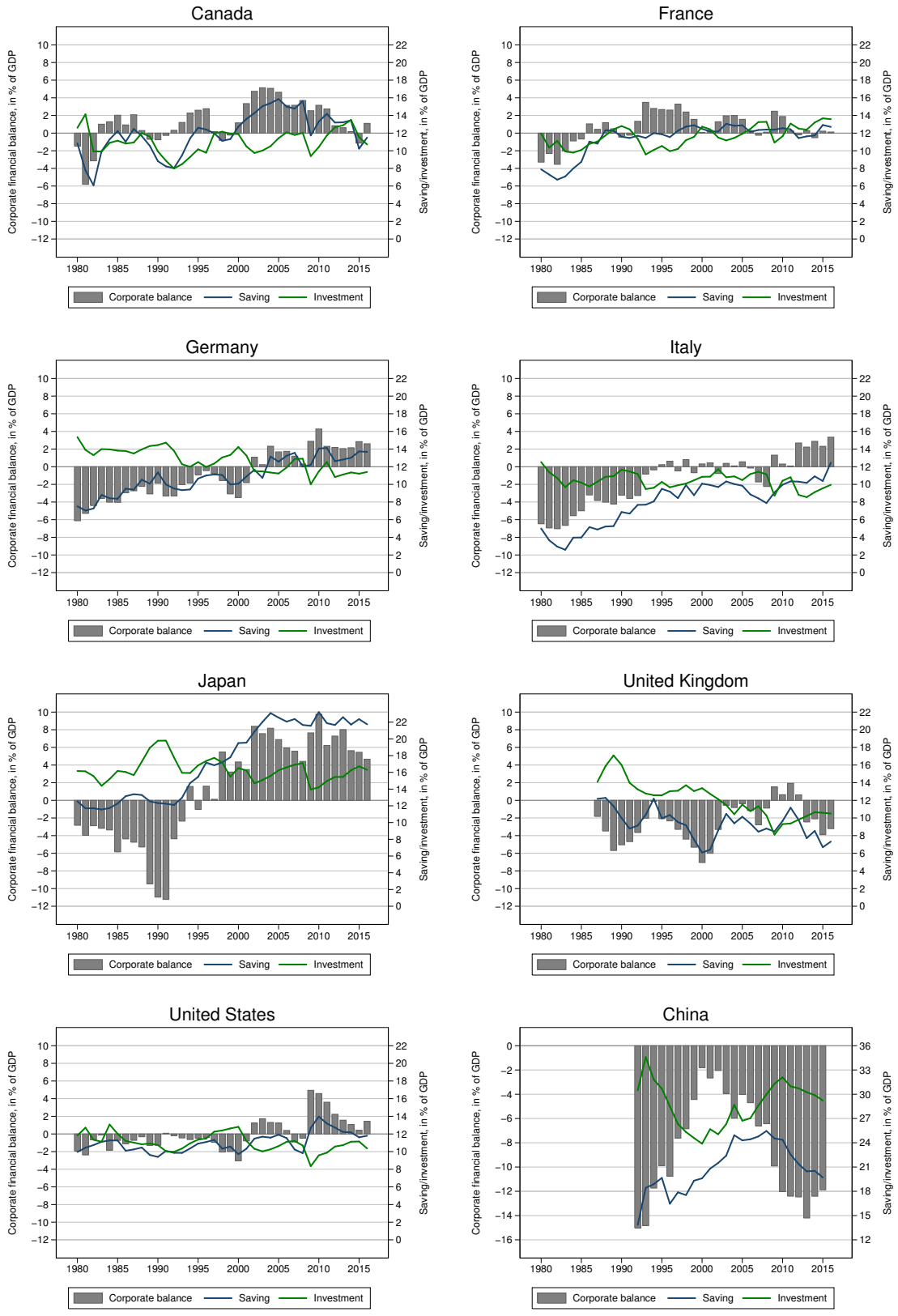
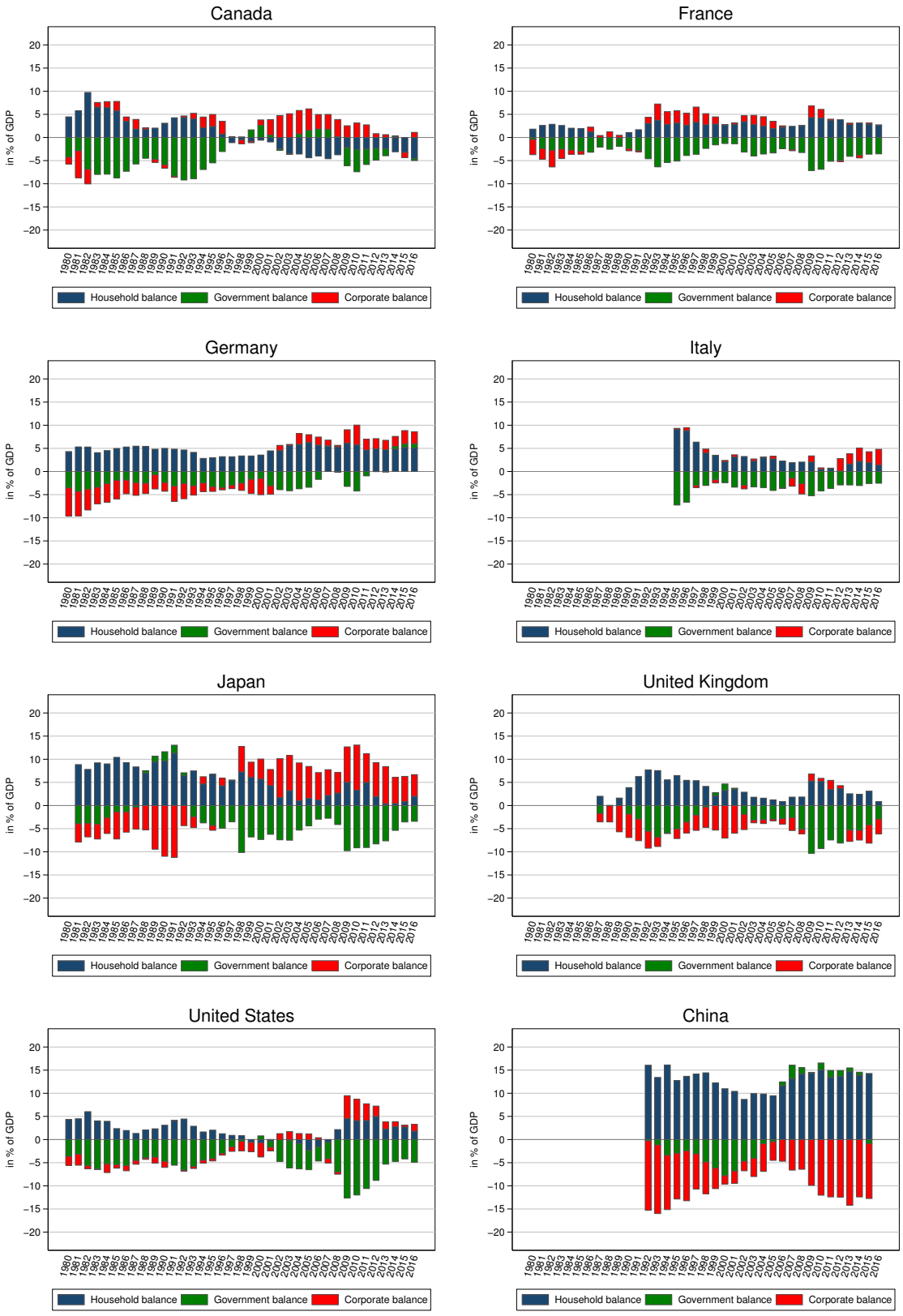
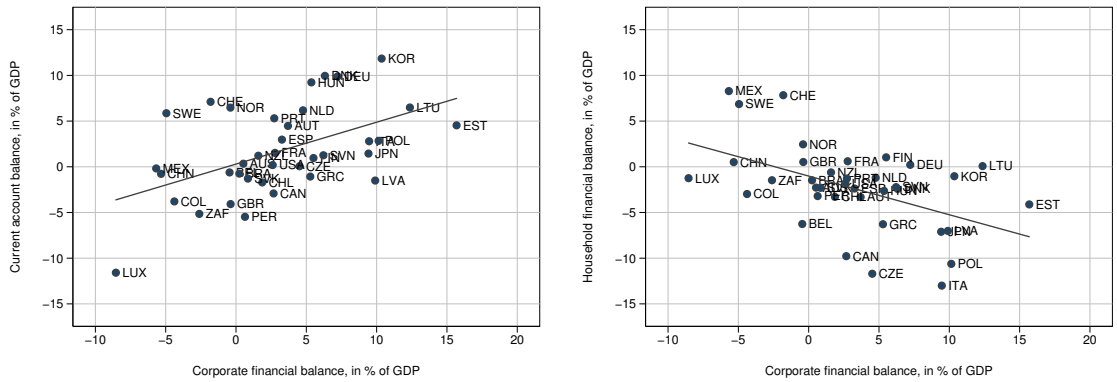


Figure 5.3: Sectoral financial balances, G7 and China



Germany and Japan, the corporate sector has turned from a pronounced net borrowing position in the 1980s and 1990s to a large and persistent net lending position since the late 1990s/early 2000s. In China, corporate net lending was highly negative in the early 1990s, but then increased strongly together with the current account balance until the mid-2000s. In these countries, the increase in corporate net lending was not sufficiently offset by a corresponding decrease in household net lending. The corporate sector thus accounts for a substantial part of the build-up of large and persistent current account surpluses in China, Germany, and Japan prior to the global financial crisis. The United Kingdom and the United States, the two main current account deficit countries prior to the global financial crisis, experienced large decreases in the household financial balance during the last two decades before the crisis, whereas the corporate financial balance exhibits no clear trend. In recent years, the financial balances of both the corporate and the household sector have increased significantly in the United Kingdom and the United States. Thus, there is little evidence that changes in corporate net lending are fully offset by changes in household net lending across the G7 countries and China.

Figure 5.4: Sectoral financial balances and current account balances



Notes: The figure shows the change in the corporate financial balance in % of GDP (horizontal axis) against the change in, respectively, the current account balance in % of GDP and the private household financial balance in % of GDP (vertical axis). Changes are calculated for the period 1980/83-2012/16 or for the longest available time span within this period.

Figure 5.4 plots changes in the corporate financial balance against changes in the current account balance and against changes in the household financial balance for a larger sample (multi-year averages 1980/83 versus 2012/16). As is apparent from the Figure, changes in the corporate financial balance are positively related to changes in the current account balance, despite a negative correlation of changes in the corporate and household financial balance. This finding is generally consistent with incomplete piercing of the corporate veil by private households. Changes in corporate net lending feed through to the current account balance, even although they are partly offset by opposite changes in household net lending.

5.3.3 An accounting perspective on the rise in corporate net lending

The corporate financial balance exhibited a secular trend relative to GDP in a number of large countries over the last decades. In order to understand the driving forces behind this development from an accounting perspective, we decompose the corporate financial balance. The corporate financial balance is defined as the difference between saving and investment of the corporate sector:

$$FB^C = S^C - I^C \tag{5.1}$$

where FB^C is the corporate financial balance. S^C and I^I denote, respectively, saving and investment of the corporate sector. Corporate saving is equal to profits that are not distributed as dividends:

$$S^C = \pi^C - D^C \tag{5.2}$$

where π^C denotes corporate profits and D^C denotes dividends. We substitute the definition of corporate saving from Equation 5.2 into Equation 5.1 and rearrange the accounting identity to relate changes in the corporate financial balance in percent of GDP more directly to its components:

$$\frac{FB^C}{Y} = \frac{S^C}{Y} - \frac{I^C}{Y} = \frac{\pi^C}{Y}\left(1 - \frac{D^C}{\pi^C} - \frac{I^C}{\pi^C}\right) \tag{5.3}$$

Equation 5.3 shows that the corporate financial balance in percent of GDP will rise as the profit share increases, as retained earnings increase relative to profits or as investment decreases relative to profits. The share of profits that are retained by the corporate sector increases when dividend payments decrease relative to profits.

Figure 5.5 shows the development of corporate investment and dividend payments in percent of corporate profits and the financial balance in percent of GDP for the G7 countries and China for the period 1980-2016. We focus on the non-financial corporate sector as data on dividend payments are not available for the total corporate sector. In Germany and Japan, investment has declined relative to profits prior to the global financial crisis, but there has only been a moderate increase in dividend payments relative to profits. As a result, the financial balance of non-financial corporations has significantly increased relative to GDP. In the United Kingdom and the United States, by comparison, the financial balance fluctuated around a largely constant trend during the decades before the crisis. In these countries, the corporate sector has passed on higher profits to the household sector which has compensated the decline in investment relative to profits during the 2000s. In China, the increase in the financial balance of non-financial corporations until the late 1990s and the subsequent decline is mirrored in the development of investment relative

Figure 5.5: Decomposition of financial balances, non-financial corporate sector, G7 and China

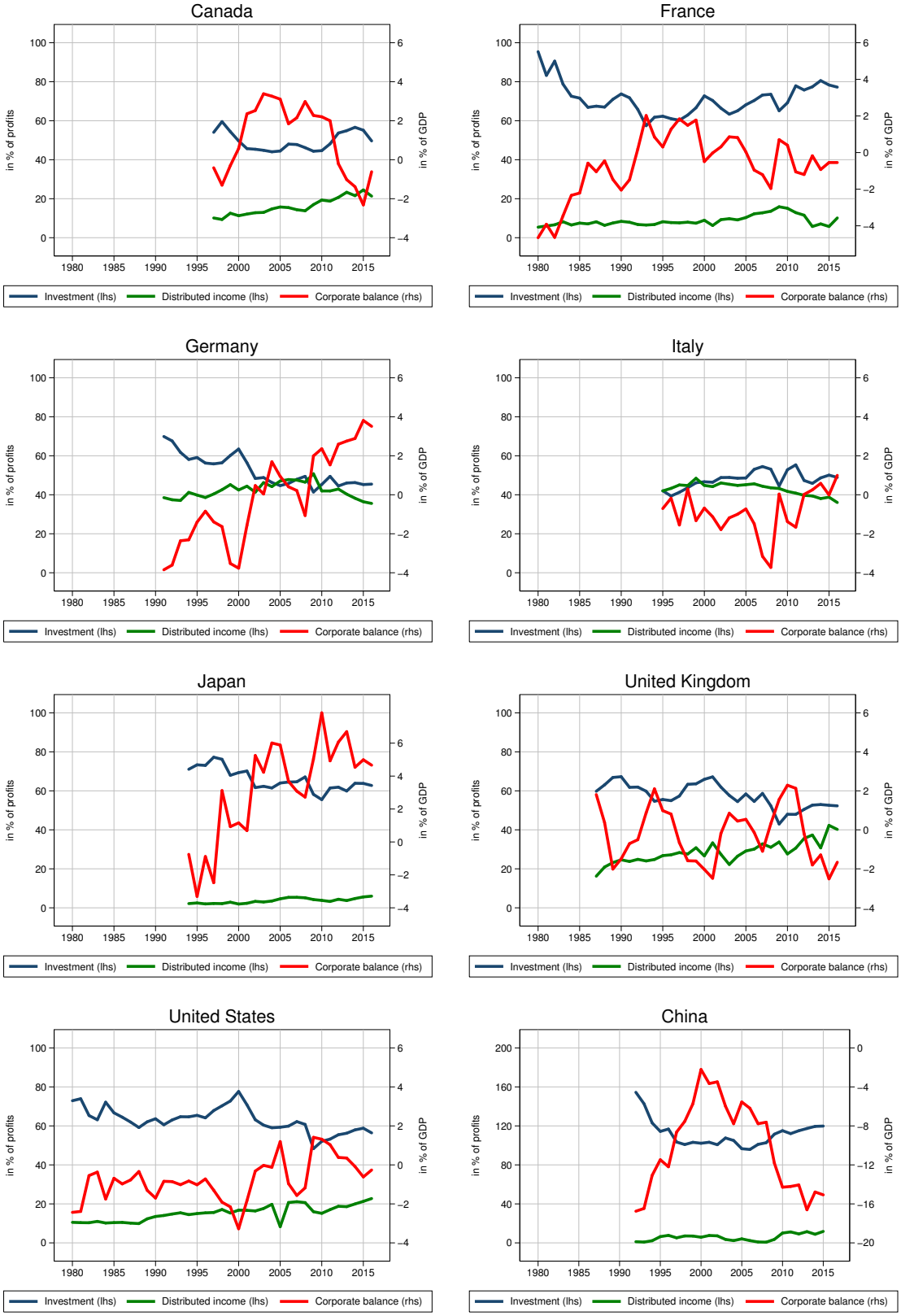
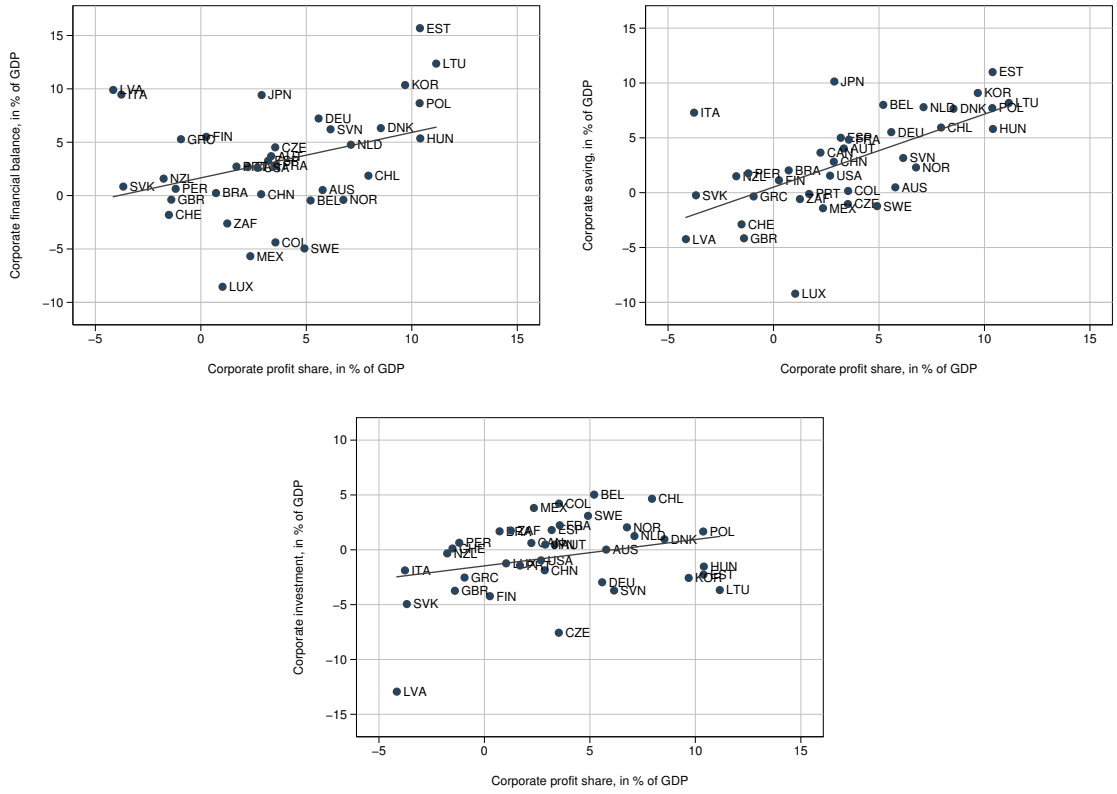


Figure 5.6: Profit shares, saving, investment, and financial balances, corporate sector

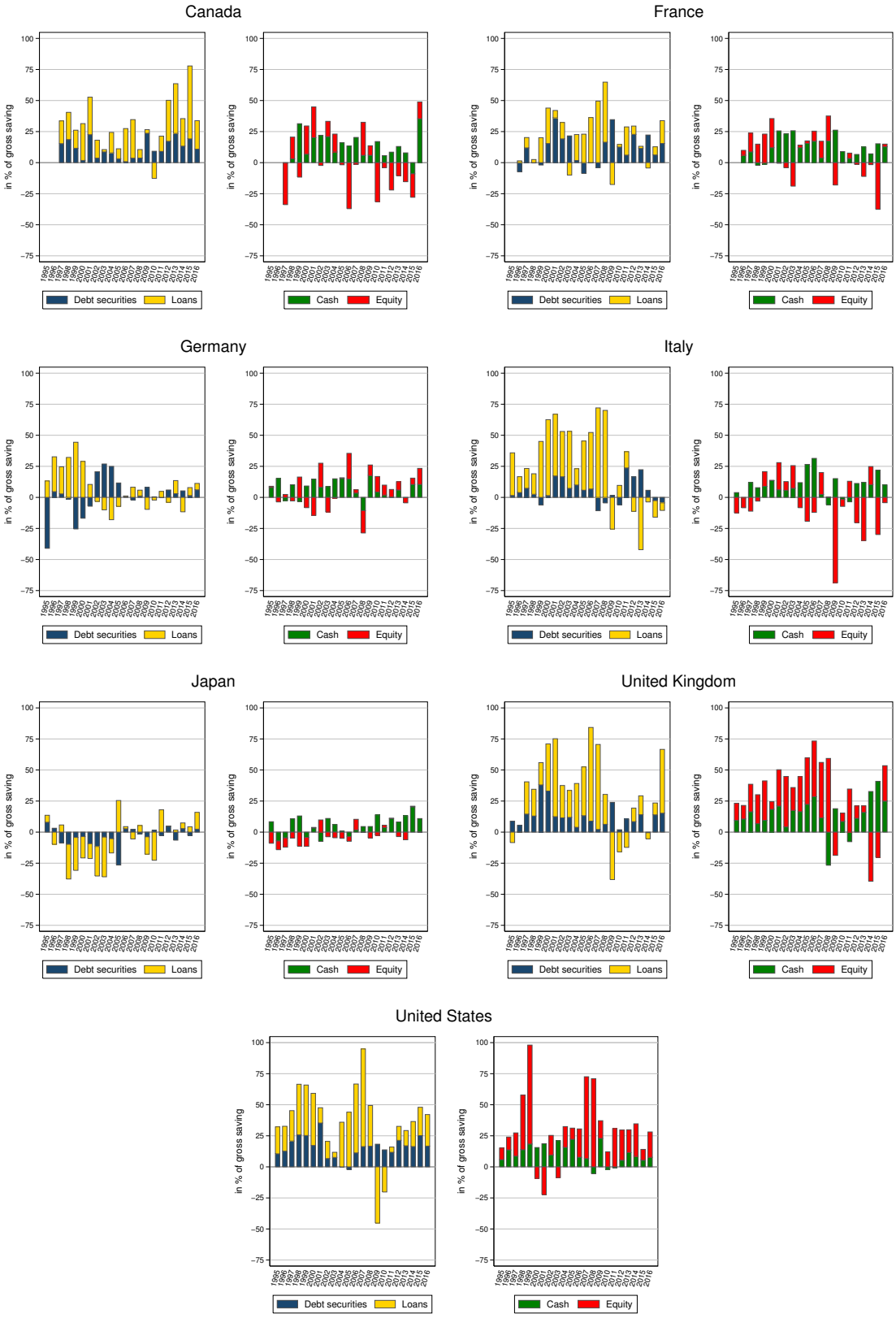


Notes: The figure shows the change in corporate profits in % of GDP (horizontal axis) against the change in, respectively, the corporate financial balance in % of GDP, corporate saving in % of GDP and corporate investment in % of GDP (vertical axis). Changes are calculated for the period 1980/83-2012/16 or for the longest available time span within this period.

to profits.

The decomposition in Equation 5.3 shows that the corporate profit share and the corporate financial balance are inherently linked, but need not necessarily move in the same directions. In Figure 5.6, we plot changes in the profit share against changes in the corporate financial balance and its components for a larger sample (multi-year averages 1980/83 versus 2012/16). There is a clear positive relationship between changes in the corporate profit share and the corporate financial balance. From Figure 5.6, it is also apparent that the correlation between changes in the profit share and changes in corporate saving is stronger than the correlation between changes in the profit share an changes in corporate investment. This observation tentatively suggests that an increase in the profit share raises corporate saving more than investment. In Section 5.4, we test the link between the profit share and the corporate financial balance more formally in a multivariate estimation framework.

Figure 5.7: Uses of saving, non-financial corporate sector, G7



5.3.4 How was the rise in corporate net lending used?

Corporations can use their saving for a combination of investments in physical capital, accumulation of cash and other financial assets, repayment of debt, or increases in equity buybacks net of issuances. Our analysis documents that the difference between corporate saving and investment has increased in most countries over the last decades. We now examine how the rise in corporate saving has affected the composition of aggregate corporate balance sheets.

Figure 5.7 shows how the saving of non-financial corporations has been allocated across different types of financial assets in the G7 countries over the period 1995-2016.[6] The graphs on the left-hand side present the change in financial liabilities minus the change in financial assets of long-term debt securities and loans in percent of corporate saving. The graphs on the right-hand side present the change in financial assets minus the change in financial liabilities of cash holdings and equity in percent of corporate saving. We define cash holdings as the sum of currency and deposits, short-term securities and investment fund shares, following Dao and Maggi (2018).

The graphs on the left-hand side of Figure 5.7 show that non-financial corporations in Japan have used on average more than 20 percent of their rising saving to repay debt obligations over the period 1996-2005 which has been the result of a long-lasting balance sheet adjustment process after the financial crisis of the early 1990s. Non-financial corporations in Germany and, to a lesser extent, in France have also used part of their saving for the net repayment of either long-term debt securities or loans during the late 1990s and early 2000s. In Canada, the United Kingdom, and the United States, non-financial corporations have markedly reduced their dependence on external financing in the period following the burst of the dotcom bubble. After the global financial crisis, non-financial corporations have increased their net repayments of debt in all countries.

Our analysis, however, suggests that non-financial corporate sector saving has not primarily been used for the repayment of debt. For most countries, the accumulation of cash holdings and equity was quantitatively more important than repaying debt. As can be seen from the right-hand side of Figure 5.7, non-financial corporations tended to invest their saving largely into cash holdings in almost all G7 countries. Over the period 1995-2016, the average share of saving used for the accumulation of cash holdings ranged between 5.4 percent in Japan and 14.1 percent in the United Kingdom. In addition, the non-financial corporate sector has accumulated substantial amounts of equity since the mid-1990s, especially in the United Kingdom and the United States. The accumulation of equity primarily reflects higher net foreign direct investment and increases in net equity buybacks from the household sector. Note that national accounts treat equity buybacks

[6] Figure 5.7 excludes China due to lack of available data.

as if they were negative issuances.[7] Thus, a change in the preference for equity buybacks relative to dividends would increase the corporate financial balance. The reason is that the value of equity buybacks net of issuances is part of corporate saving whereas dividend payments are considered as a form of corporate dissaving in national accounts.[8]

5.4 Empirical analysis

5.4.1 The corporate balance model

This section illustrates the analytical framework behind the empirical analysis. The corporate financial balance is by definition equal to the difference between saving and investment of the corporate sector:

$$FB^C = S^C(X_S) - I^C(X_I) = FB^C(X_S, X_I) \tag{5.4}$$

where FB^C is the financial balance of the corporate sector. S^C and I^C denote corporate saving and corporate investment. X_S and X_I refer to factors that may affect saving and investment, respectively.

Equation 5.4 suggests that it is important to consider both saving and investment determinants to build a comprehensive model of the corporate financial balance. The selection of the explanatory variables used in our regression model is based on the recent theoretical and empirical literature on the saving and investment behavior of the corporate sector. In particular, we include proxy variables to control for the corporate balance effects of cyclical fluctuations, precautionary motives in the face of uncertainty, foreign direct investment activities and changes in trend growth prospects or the stock market.

In the following, we briefly describe the explanatory variables and possible effects on the corporate financial balance and its components: We use real GDP growth to capture the effect of business cycle fluctuations on the corporate financial balance. Higher real GDP growth may affect corporate expectations about future income which induces an expansion in investment and a lower financial balance. Conversely, a negative shock to real GDP growth should be associated with an increase in the corporate financial balance resulting from more prudent financial behavior and postponed investment spending due to a lack of aggregate demand. Stock price volatility is used to account for precautionary motives associated with risks to financial market stability. Firms will likely reduce investment spending and increase their financial balances during periods of financial tur-

[7] A negative value of equity liabilities indicates that equity buybacks exceed the issuance of new equity. This translates into an increase in our measure of equity as shown in Figure 5.7 which is defined as the change in financial assets minus the change in financial liabilities.

[8] Chen et al. (2017) show that subtracting the value of net equity buybacks from corporate saving does not significantly affect the evolution of the global corporate saving rate. Similarly, Gruber and Kamin (2016) document a small trend in net equity buybacks in percent of GDP for OECD countries.

bulences and higher uncertainty in order to accumulate financial assets and strengthen their balance sheets. The expected GDP growth rate (5 years ahead) is used to measure the underlying growth potential of an economy. Lower trend growth prospects may reflect a lack of profitable investment opportunities and are thus a disincentive to current investment spending leading to a higher corporate financial balance. Conversely, countries with higher trend growth rates are expected to invest more and have a lower financial balance. We include net foreign direct investment flows in percent of GDP as a proxy for the corporate sector globalization process. An increase in foreign investment activities of multinational firms should be associated with an increase in the corporate financial balance as reinvested profits of foreign direct investment firms are recorded as corporate saving in the national accounts.[9] We use stock market capitalization in percent of GDP as a proxy for Tobin's q to examine whether corporate investment behavior and the corporate financial balance are related to changes in the stock market. A higher stock market capitalization may signal an increase in the market value of capital relative to its replacement costs which should encourage corporations to expand investment in capital.

In addition to these determinants, we include the corporate profit share in our corporate balance regressions. While we expect a positive relationship between the profit share and corporate net lending, we are also interested in whether the impact of the profit share works primarily through corporate saving or corporate investment. In addition, we use different indicators measuring the cost of capital to empirically assess the hypothesis by Chen et al. (2017) that the rise in both the profit share and corporate net lending can be attributed to a lower cost of capital.

5.4.2 Estimation strategy

The empirical analysis is based on the corporate balance model in Equation 5.4. The most general version of the regression specification can be written as follows:

$$FB^C_{i,t} = X_{i,t}\Gamma + \beta_1 PS^C_{i,t} + \mu_i + \lambda t + \varepsilon_{i,t} \tag{5.5}$$

where $i = 1, \ldots, N$ and $t = 1, \ldots, T$ denote the cross-sectional and time dimensions, respectively. The dependent variable $FB^C_{i,t}$ is the corporate financial balance in percent of GDP and $X_{i,t}$ is a set of explanatory variables including real GDP growth, stock price volatility, expected GDP growth, net FDI flows in percent of GDP, and stock market capitalization in percent of GDP. $PS^C_{i,t}$ refers to the corporate sector profit share in percent of GDP. The model also includes country fixed effect μ_i and a linear time trend t. $\varepsilon_{i,t}$ is a residual error term with zero mean.

[9] Reinvested earnings on foreign direct investment consist of the retained earnings of the foreign direct investment firm which are treated as if they were distributed and remitted to foreign direct investors in proportion to their ownership of the equity of the firm and then reinvested in the firm.

Table 5.2: Corporate balance regression model

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regressor	FB^C	FB^C	FB^C	FB^C	SAV^C	SAV^C	INV^C	INV^C
L.Real GDP growth	-0.288***	-0.249***	-0.316***	-0.291***	-0.046*	-0.030	0.243***	0.232***
	(0.045)	(0.045)	(0.044)	(0.045)	(0.025)	(0.025)	(0.029)	(0.030)
Stock price volatility	0.074***	0.074***	0.084***	0.083***	0.012	0.011	-0.047***	-0.046***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.012)	(0.012)	(0.010)	(0.010)
5-year growth forecast	-1.282***	-0.781***	-1.032***	-0.762***	-0.461***	-0.265**	0.544***	0.431***
	(0.206)	(0.223)	(0.200)	(0.215)	(0.119)	(0.122)	(0.123)	(0.135)
Net FDI flows (% of GDP)	0.028**	0.026*	0.025*	0.024*	0.025**	0.025*	0.000	0.000
	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)	(0.013)	(0.004)	(0.005)
L.Stock market capitalization (% of GDP)	-0.018***	-0.032***	-0.028***	-0.035***	-0.011**	-0.017***	0.013***	0.016***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.003)	(0.003)
Trend	-	0.161***	-	0.096***	-	0.076***	-	-0.039**
		(0.028)		(0.027)		(0.019)		(0.016)
Corporate profit share (% of GDP)	-	-	0.508***	0.456***	0.598***	0.560***	0.092**	0.114**
			(0.065)	(0.068)	(0.044)	(0.046)	(0.044)	(0.045)
Observations	803	803	803	803	803	803	803	803
Countries	40	40	40	40	40	40	40	40
R-squared	0.601	0.609	0.647	0.647	0.770	0.772	0.844	0.844
RMSE	0.032	0.031	0.030	0.030	0.020	0.020	0.018	0.018

Notes: FB^C is the corporate financial balance in % of GDP, SAV^C is corporate saving in % of GDP, INV^C is corporate investment in % of GDP. All regressions are estimated by GLS with a panel-wide AR(1) correction and include country fixed effects. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 5.A for a detailed description of the data.

We can inquire further into the functional chains linking the profit share and the corporate financial balance by estimating Equation 5.5 with the same explanatory variables for corporate saving and investment, which by definition sum up to the corporate financial balance. We can thus test whether a change in the profit share and the other explanatory variables affects primarily corporate saving or investment.

We work with an unbalanced panel that includes 40 countries for which series on the explanatory variables are available for the period 1990-2016. The sample consists largely of advanced economies but also a few emerging economies. The following countries are included in the sample: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Peru, Poland, Portugal, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Variable definitions and data sources are provided in Appendix 5.A.

We estimate the corporate balance regression model using generalized least squares (GLS) based on a sample of annual observations. As the data on the dependent variable display autocorrelation, we implement a correction for first-order autocorrelation within panels and specify that the coefficient of the AR(1) process is common across panels. The estimation strategy largely follows Phillips et al. (2013) which provide a conceptual and methodological framework for the empirical analysis of current account balances. The regression model includes country fixed effects to account for idiosyncratic differences in corporate saving and investment behavior across countries which are unlikely to be explained by the other variables. Some specifications also include a linear time trend.

5.4.3 Results

What drives the rise in corporate net lending?

Table 5.2 presents the results for different variants of Equation 5.5. The specifications are based on GLS estimations with a panel-wide AR(1) correction. Columns 1 and 2 show the results for the baseline model without the profit share variable. We use lagged variables in those cases where simultaneity bias may be expected. Estimated coefficients are statistically significant and have expected signs and plausible magnitudes.

Our estimations show that real GDP growth is negatively related to the corporate financial balance. The coefficient on real GDP growth implies that a 1 percentage point decrease in economic growth leads to a 0.29 percentage point increase in the corporate financial balance. This result is consistent with the hypothesis that the rise in corporate net lending partly reflects an endogenous response to the business cycle. The stock price volatility has a statistically significant and positive effect on the corporate financial balance, a finding that may be explained through precautionary motives in the face of un-

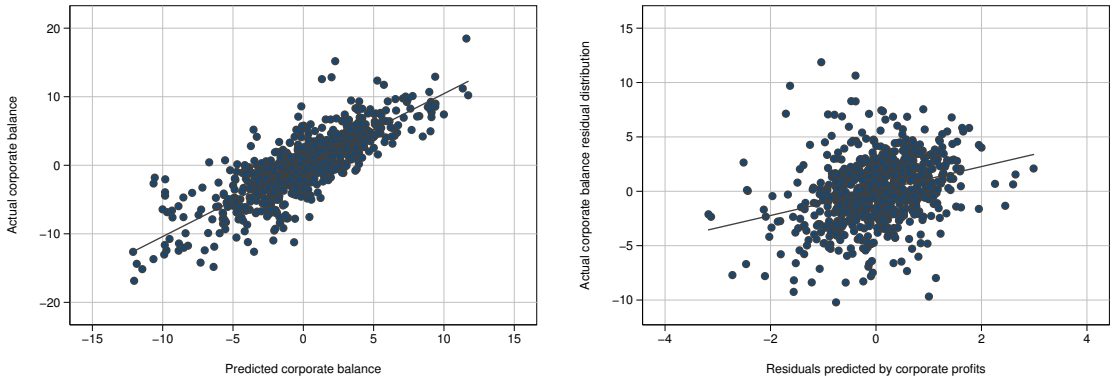
certainty. An increase in stock price volatility by 10 percentage points is associated with a higher corporate financial balance of about 0.7 percent of GDP. Lower trend growth prospects significantly increase the corporate financial balance. This result may reflect a lack of profitable investment opportunities which can cause a decline in investment spending and a higher corporate financial balance. According to our estimates, a decrease in expected GDP growth by 1 percentage point raises the corporate financial balance by 1.28 percentage points. The coefficient on net FDI flows is also statistically significant, with the expected positive sign. The estimated coefficient is about 0.03, reflecting the improvement of a country's corporate financial balance position due to foreign investment activities of multinational firms. Finally, stock market capitalization is negatively linked to the corporate financial balance, in line with the standard Tobin's q argument. Our estimates suggest that an increase in stock market capitalization of 10 percent of GDP reduces the corporate financial balance by about 0.18 percent of GDP. In Column 2, a linear trend is added to the regression model. The results are generally robust in terms of size and significance of the estimated coefficients, compared with the model from Colum 1. The estimated coefficient suggests that the corporate financial balance exhibits a statistically significant positive trend which is of a similar size as in Section 5.3.[10]

When the corporate profit share is included in the model as an additional regressor (Column 3), the model fit improves, as indicated by the R-squared and the root mean squared error (RMSE). The estimated coefficient on the corporate profit share is highly significant and of positive sign. It implies that a 1 percentage point increase in the corporate profit share leads to a 0.51 percentage points increase in the corporate financial balance. This is consistent with the hypothesis that the rise in corporate net lending is partly attributable to changes in the distribution of income between wages and profits. Column 4 shows that the coefficient on the linear trend in the corporate financial balance is considerably smaller when the profit share is added to the regression model. The profit share variable included in the corporate balance model of Table 5.2 is not only statistically, but also economically significant. The graphs shown in Figure 5.8 are based on the estimation results reported in Column 4 of Table 5.2, where the profit share is included as an explanatory variable. While the left graph of Figure 5.8 shows the overall very good performance of the model, the right graph shows that the profit share variable explains almost 9 percent of the otherwise unexplained variation in the corporate financial balance.

We also estimate the model for corporate saving and investment separately. By definition, the corporate financial balance is equal to the difference between saving and investment. Hence, estimations for the components of the corporate balance may yield further insights into the ways in which the variables affect corporate saving and investment.

[10]Note that the estimation results are robust to using time fixed effects. However, the coefficient on stock price volatility becomes statistically insignificant when time fixed effects are added to the regression model.

Figure 5.8: Role of corporate profits: predicted and actual corporate balance residuals



Notes: The left graph shows the predicted corporate financial balances from the model reported in Table 5.2, Column 4 (horizontal axis) against the actual corporate financial balances (vertical axis). In the right graph, the vertical axis measures the actual corporate financial balance residuals from the baseline model without the profit share variable reported in Table 5.2, Column 2. The horizontal axis shows the corporate financial balance levels predicted by regressing corporate financial balance residuals (from the baseline model without the profit share variable) on the profit share variable.

According to our estimates, real GDP growth appears to operate mainly through the investment channel (Columns 7 and 8). This result suggests that for countries with declining investment spending in recent years, the increase in corporate net lending partly reflects the slowdown in economic growth, thus confirming the analysis by Gruber and Kamin (2016). However, there is little evidence that the rise in corporate saving reflects an endogenous response to cyclical fluctuations (Columns 5 and 6). Stock price volatility also appears to be unrelated to corporate saving. By contrast, the estimated effect of stock price volatility on the investment ratio is statistically significant and negative. Similarly, the forecast growth rate is a statistically significant determinant of the investment ratio. This result suggests that low growth prospect may contribute to periods of depressed investment spending, in line with concerns about secular stagnation (Summers, 2014; Rachel and Summers, 2019). The forecast growth rate affects the corporate financial balance also through the saving channel which possibly reflects higher dividend payments during periods of favorable growth perspectives. The saving channel also plays a significant role for net FDI flows while stock market capitalization appears to operate through the saving and investment channel. The corporate profit share is positively related to corporate saving and this effect is highly significant. The estimated coefficient implies that a 1 percentage point increase in the profit share leads to a 0.6 percentage points increase corporate saving in percent of GDP (Column 5). By contrast, the effect of the profit share on the investment ratio is substantially smaller (Column 7) which implies that the rise in profits increases corporate saving more than corporate investment. Again, the results are robust to the inclusion of a linear trend (Columns 6 and 8).

Table 5.3: Corporate balance regression model: cost of capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Regressor	FB^C	FB^C	FB^C	FB^C	FB^C	FB^C	SAV^C	INV^C
L.Real GDP growth	-0.236***	-0.274***	-0.221***	-0.236***	-0.213***	-0.200***	0.014	0.206***
	(0.048)	(0.048)	(0.047)	(0.047)	(0.046)	(0.044)	(0.033)	(0.030)
Stock price volatility	0.087***	0.100***	0.091***	0.087***	0.075***	0.078***	0.003	-0.052***
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.014)	(0.010)
5-year growth forecast	-0.942***	-0.916***	-0.961***	-0.940***	-0.885***	-0.904***	-0.417**	0.486***
	(0.237)	(0.229)	(0.236)	(0.237)	(0.232)	(0.230)	(0.163)	(0.128)
Net FDI flows (% of GDP)	0.026**	0.025*	0.027**	0.026**	0.023*	0.024*	0.027**	0.002
	(0.013)	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.013)	(0.004)
L.Stock market capitalization (% of GDP)	-0.032***	-0.035***	-0.035***	-0.033***	-0.031***	-0.033***	-0.014**	0.016***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.003)
Trend	0.122***	0.067**	0.063*	0.152***	0.148***	0.116***	0.139***	0.020
	(0.028)	(0.027)	(0.032)	(0.034)	(0.030)	(0.039)	(0.030)	(0.019)
Corporate profit share (% of GDP)	-	0.431***	-	-	-	-	-	-
		(0.071)						
Relative price of investment goods	-	-	-0.103***	-	-	-0.102***	-0.033	0.045**
			(0.032)			(0.033)	(0.024)	(0.018)
Corporate income tax rate	-	-	-	0.065	-	0.057	0.034	0.011
				(0.040)		(0.039)	(0.028)	(0.023)
Real interest rate	-	-	-	-	0.138***	0.135***	0.003	-0.117***
					(0.047)	(0.045)	(0.032)	(0.028)
Observations	762	762	762	762	762	762	762	762
Countries	40	40	40	40	40	40	40	40
R-squared	0.593	0.628	0.596	0.595	0.601	0.603	0.706	0.849
RMSE	0.032	0.030	0.032	0.031	0.031	0.030	0.023	0.017

Notes: FB^C is the corporate financial balance in % of GDP, SAV^C is corporate saving in % of GDP, INV^C is corporate investment in % of GDP. All regressions are estimated by GLS with a panel-wide AR(1) correction and include country fixed effects. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 5.A for a detailed description of the data.

Is the profit share effect due to lower cost of capital?

In this Subsection, we analyze whether the link between the profit share and the corporate financial balance is due to a decline in the cost of capital. Chen et al. (2017) emphasize that changes in the cost of capital are important for understanding the evolution of corporate saving and the financial balance. They argue that, with an elasticity of substitution above one in production, a decline in the cost of capital leads to a decline in the labor share and an increase in corporate profits. Given the stability of dividend payments, the increase in profits implies an increase in corporate saving. According to Chen et al. (2017), the most important drivers of this change are the declines in the price of investment goods, corporate income taxes, and the real interest rate. We test the relevance of the cost of capital hypothesis empirically and examine whether changes in the relative price of investment goods, corporate income taxes, and the real interest rate contribute to the rise of corporate saving and the financial balance.

Columns 1 and 2 of Table 5.3 present the results for the corporate balance model based on a sample for which data on the relative price of investment goods, corporate income taxes, and real interest rates are available. The results are very similar compared with the models from Table 5.2, Columns 2 and 4, in terms of size and significance of the estimated coefficients. The profit share is found to be statistically significant and the fit of the model improves relative to the model in Column 2.

In the models presented in Columns 3-5, measures for the relative price of investment goods, corporate income taxes, and real interest rates were added to the baseline model (excluding the corporate profit share). The relative price of investment goods is significantly and negatively related to the corporate financial balance. A 1 percentage point decline in the relative price of investment goods increases the corporate financial balance by 0.1 percentage points (Column 3). The corporate income tax rate is not a statistically significant determinant of the corporate financial balance (Column 4). The estimated effect of the real interest rate on the corporate financial balance is statistically significant and positive. A 1 percentage point increase in the real interest rate raises the corporate financial balance by 0.14 percentage points (Column 5).

In Columns 6-8, we present models for the corporate financial balance as well as corporate saving and investment in which all measures for the different components of the cost of capital are included in the estimation. While the estimated effects of the relative price of investment goods, corporate income taxes, the real interest rate, and the control variables remain stable overall, compared to the models in Columns 3-5, the results differ from the analysis by Chen et al. (2017). Our estimations show that the relative price of investment goods is negatively related to the corporate financial balance (Column 6). However, we do not find evidence that the decline in the relative price of investment goods is associated with an increase in corporate saving (Column 7), as predicted by Chen et al.

(2017). Our results rather suggest that the corporate balance effects of changes in the relative price of investment goods stem from a positive effect on corporate investment (Column 8). Although this finding may seem counterintuitive, it is consistent with empirical evidence indicating that the elasticity of substitution between capital and labor is less than one (e.g. Antràs, 2004; Oberfield and Raval, 2014; Lawrence, 2015; Gechert et al., 2019). On the one hand, a decline in the relative price of investment goods reduces the costs to pursue a given investment project and thus lower nominal spending is needed to achieve a given investment volume. On the other hand, a decline in the relative price of investment goods also creates incentives for additional investment projects due to the lower cost of capital. Theoretically, the effect of the relative price of investment goods on the (nominal) investment ratio depends on the elasticity of substitution between capital and labor. If the elasticity of substitution is less than one, then a decline the relative price of investment goods should lead to a decline in the investment ratio as the volume of investment increases less than the price falls. Moreover, we do not find evidence that changes in the real interest rate affect the corporate financial balance through the saving channel (Column 7). According to our estimates, the real interest rate is negatively related to corporate investment (Column 8) which translates into an overall positive effect on the corporate financial balance (Column 6). By contrast, in the model by Chen et al. (2017), a decline in the real interest rate generates an increase in corporate saving above corporate investment through its impact on the cost of capital and the labor share.[11] Finally, the fit of the model increases only slightly, with the R-squared rising from 0.59 in the baseline model (Column 1) to 0.6 in the model including measures for the different components of the cost of capital (Column 6). Overall, there is only limited evidence that the decline in the cost of capital fully accounts for the increase in corporate profits and the rising corporate net lending positions across countries in recent decades. Our results rather suggest the possibility that other factors, such as decreased competition leading to higher markups, might explain the link between the profit share and the corporate financial balance. Unfortunately, due to lack of data, we cannot provide a direct test of this hypothesis in our macro panel analysis.

Robustness

The estimations reported in Table 5.4 perform three sets of robustness checks. Firstly, in Columns 1-3, we present models for the non-financial corporate sector. The corporate sector consists of both non-financial corporations and financial corporations (e.g. banks, pension funds or insurance companies). Given that the behavior of the total corporate sector is largely driven by non-financial corporations, and in order to clarify whether

[11] In Chen et al. (2017), changes in real interest rates are quantitatively very important for the evolution of corporate saving. Their counterfactual exercises show that removing the decline in the real interest rate would actually lead to a decrease in corporate saving.

the results are sensitive to trends in the financial corporate sector, we also estimate the regression model for the non-financial corporate sector.

The results reported in Columns 1-3 are very similar to those obtained for the total corporate sector. The estimated coefficients of the explanatory variables are mostly statistically significant and have expected signs. The profit share of the non-financial corporate sector is positively related to the financial balance of the non-financial corporate sector and this effect appears to operate mainly through the saving channel. As can be seen in Columns 1-3 of Table 5.4, the estimated effects of the profit share on the financial balance of the non-financial corporate sector and its components are similar in magnitude, compared to the estimations reported in Table 5.2. Thus, the results suggest that the link between the profit share and the financial balance of the total corporate sector is not driven by trends in the financial sector.

Secondly, we test whether shifts in the sectoral composition affect the link between the profit share and the corporate financial balance. Over the last decades, most advanced countries have gone through significant structural changes related to their composition of industrial sectors. The relative contribution of the manufacturing sector to GDP has declined whereas the share of GDP accounted for by services experienced a sharp increase in almost all countries. This change in the sectoral composition could have contributed to a decline in the labor share due for example to the lower prevalence of trade unions in the services sector. At the same time, the shift from manufacturing toward services is likely to be accompanied by a higher corporate financial balance as financial constraints tend to be more severe in the services sector.

The estimations reported in Columns 4-6 include the value added of services in percent of GDP as an additional regressor. According to our estimates, the value added of services is positively related to the corporate financial balance (Column 4). A 1 percentage point increase in the value added of services raises the corporate financial balance by 0.44 percentage points. The corporate balance effects of changes in the sectoral composition appear to operate mainly through the saving channel (Column 5) which is consistent with the notion that firms in certain services industries are typically faced with more restricted access to external financing. As can be seen in Columns 4-6 of Table 5.4, the estimated coefficients on the corporate profit share remain virtually unchanged, compared with the models from Table 5.2, even when we control for changes in the sectoral composition.

Thirdly, we also analyze the role of intangible capital for the link between the profit share and the corporate financial balance. In recent years, a number of studies have documented a shift in the composition of investment toward intangible assets across countries (e.g. Corrado et al., 2009; Corrado et al., 2012). Gutiérrez and Philippon (2017*a*) discuss the possibility that an increase in the share of intangible capital could lead to an increase in profits through competitive payments for intangible services and a decrease in (measured) investment. The shift toward more investment in intangible capital might

Table 5.4: Corporate balance regression model: robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Regressor	FB^{NFC}	SAV^{NFC}	INV^{NFC}	FB^{C}	SAV^{C}	INV^{C}	FB^{C}	SAV^{C}	INV^{C}
L.Real GDP growth	-0.314***	-0.058**	0.247***	-0.245***	-0.012	0.210***	-0.230***	-0.039	0.178***
	(0.046)	(0.027)	(0.032)	(0.046)	(0.025)	(0.031)	(0.049)	(0.025)	(0.032)
Stock price volatility	0.053***	-0.005	-0.044***	0.084***	0.002	-0.059***	0.091***	-0.001	-0.067***
	(0.015)	(0.009)	(0.010)	(0.017)	(0.013)	(0.010)	(0.016)	(0.009)	(0.010)
5-year growth forecast	-0.763***	-0.208*	0.513***	-0.700***	-0.246**	0.439***	-0.496**	-0.151	0.408***
	(0.213)	(0.126)	(0.140)	(0.214)	(0.124)	(0.133)	(0.230)	(0.117)	(0.147)
Net FDI flows (% of GDP)	0.026	0.021	-0.003	0.025*	0.025*	0.000	0.017	0.006	-0.020
	(0.023)	(0.022)	(0.005)	(0.014)	(0.013)	(0.005)	(0.033)	(0.019)	(0.020)
L.Stock market capitalization (% of GDP)	-0.022***	-0.008	0.012***	-0.034***	-0.015***	0.017***	-0.043***	-0.014***	0.021***
	(0.007)	(0.006)	(0.003)	(0.006)	(0.005)	(0.003)	(0.006)	(0.005)	(0.003)
Trend	0.028	0.048***	-0.010	-0.033	-0.018	-0.007	0.037	0.007	-0.042**
	(0.026)	(0.019)	(0.015)	(0.043)	(0.029)	(0.025)	(0.032)	(0.019)	(0.019)
Non-financial corporate profit share (% of GDP)	0.499***	0.621***	0.129**	-	-	-	-	-	-
	(0.068)	(0.047)	(0.052)						
Corporate profit share (% of GDP)	-	-	-	0.619***	0.647***	0.056	0.502***	0.575***	0.099**
				(0.080)	(0.053)	(0.051)	(0.076)	(0.048)	(0.049)
Services value added (% of GDP)	-	-	-	0.437***	0.294***	-0.108	-	-	-
				(0.107)	(0.074)	(0.066)			
Investment in intangible assets (% of total investment)	-	-	-	-	-	-	0.318***	0.184***	-0.096**
							(0.068)	(0.041)	(0.038)
Observations	768	768	768	773	773	773	642	642	642
Countries	40	40	40	40	40	40	30	30	30
R-squared	0.595	0.708	0.840	0.659	0.778	0.830	0.685	0.802	0.815
RMSE	0.032	0.023	0.019	0.029	0.020	0.018	0.031	0.019	0.019

Notes: FB^{NFC} is the financial balance of the non-financial corporate sector in % of GDP, SAV^{NFC} is saving of the non-financial corporate sector in % of GDP, INV^{NFC} is investment of the non-financial corporate sector in % of GDP. FB^{C} is the corporate financial balance in % of GDP, SAV^{C} is corporate saving in % of GDP, INV^{C} is corporate investment in % of GDP. All regressions are estimated by GLS with a panel-wide AR(1) correction and include country fixed effects. Heteroskedasticity robust standard errors are reported in parentheses. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 5.A for a detailed description of the data.

also contribute to higher corporate saving. As intangible capital is more difficult to use as collateral for external borrowing, corporations with a high share of intangibles need to accumulate internal funds in order to avoid being financially constrained in the future (Falato et al., 2013).

In Columns 7-9, we present models in which the share of intangibles in investment is included as an additional regressor.[12] The estimated effect of the share of intangible investment on the corporate financial balance is statistically significant and positive (Column 7). A 1 percentage point increase in the share of investment in intangible assets raises the corporate financial balance by 0.32 percentage points. Our results show that share of investment in intangible assets is positively related to corporate saving, in line with the analysis by Falato et al. (2013). There is also evidence for a negative link between the share of intangibles and corporate investment which is consistent with previous findings (e.g. Döttling et al., 2017; Döttling and Perotti, 2017; Gutiérrez and Philippon, 2017*a*,*b*; Alexander and Eberly, 2018; Döttling et al., 2018; Crouzet and Eberly, 2019). However, the results in Column 7-9 suggest that the estimated coefficients on the corporate profit share remain roughly the same, compared with the models from Table 5.2, even when the share of intangible investment is added to the models.

Has corporate net lending been different during the Great Recession?

We also address the question of whether the pattern of the corporate financial balance has been different during the global financial crisis and its aftermath. Indeed, the corporate financial balance reached a historic high in the G7 countries during the global financial crisis after 2007 (see Figure 5.1) and this pattern was widespread across other advanced economies. Gruber and Kamin (2016) hypothesize that the sharp rise in the corporate financial balance since the global financial crisis might represent a break with the past. They discuss the possibility that the crisis has persistently raised the level of uncertainty about future demand or that corporations require higher returns to initiate new investment projects.

The results in Table 5.5 do not support such a hypothesis, however. In Column 1, the corporate balance model is estimated for the period 1990-2007. The results for the pre-crisis sample are similar to those obtained for the full sample in terms of size and significance of the estimated coefficients (Column 4 of Table 5.2). We also test for differentials in the pattern of the corporate financial balance during the Great Recession compared to the non-crisis sample. In Columns 2-7 of Table 5.5, we extend the specification by adding interaction terms between the explanatory variables and a dummy variable for the Great Recession, which takes a value of one for the years 2008-2012. This approach allows us

[12]Note that the sample is somewhat smaller due to the availability of data on intangible investment. Moreover, we do not include Ireland in the estimations because it is a clear outlier in terms of investment in intangible assets.

Table 5.5: Corporate balance regression model: pre-crisis sample and global financial crisis dummy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regressor	FB^C	FB^C	FB^C	FB^C	FB^C	FB^C	FB^C
L.Real GDP growth	-0.330***	-0.419***	-0.290***	-0.290***	-0.292***	-0.293***	-0.291***
	(0.060)	(0.053)	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)
Stock price volatility	0.049**	0.080***	0.075***	0.080***	0.083***	0.083***	0.082***
	(0.020)	(0.016)	(0.020)	(0.017)	(0.017)	(0.017)	(0.017)
5-year growth forecast	-0.300	-0.826***	-0.782***	-0.793***	-0.766***	-0.769***	-0.768***
	(0.237)	(0.214)	(0.216)	(0.221)	(0.215)	(0.217)	(0.216)
Net FDI flows (% of GDP)	0.018	0.025**	0.025*	0.025*	0.020	0.024*	0.025*
	(0.014)	(0.013)	(0.014)	(0.014)	(0.015)	(0.014)	(0.014)
L.Stock market capitalization (% of GDP)	-0.034***	-0.037***	-0.035***	-0.036***	-0.035***	-0.035***	-0.035***
	(0.008)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Trend	0.137***	0.072***	0.089***	0.091***	0.096***	0.096***	0.095***
	(0.046)	(0.027)	(0.028)	(0.028)	(0.027)	(0.027)	(0.028)
Corporate profit share (% of GDP)	0.435***	0.483***	0.458***	0.455***	0.455***	0.456***	0.456***
	(0.078)	(0.067)	(0.067)	(0.068)	(0.068)	(0.068)	(0.068)
L.Real GDP growth × GFC dummy	-	0.222***	-	-	-	-	-
		(0.063)					
Stock price volatility × GFC dummy	-	-	0.011	-	-	-	-
			(0.014)				
5-year growth forecast × GFC dummy	-	-	-	0.071	-	-	-
				(0.100)			
Net FDI flows (% of GDP) × GFC dummy	-	-	-	-	0.027	-	-
					(0.035)		
L.Stock market capitalization (% of GDP) × GFC dummy	-	-	-	-	-	-0.001	-
						(0.003)	
Corporate profit share (% of GDP) × GFC dummy	-	-	-	-	-	-	0.001
							(0.012)
Observations	518	803	803	803	803	803	803
Countries	40	40	40	40	40	40	40
R-squared	0.713	0.654	0.646	0.647	0.647	0.647	0.647
RMSE	0.035	0.030	0.030	0.030	0.030	0.030	0.030

Notes: FB^C is the corporate financial balance in % of GDP, SAV^C is corporate saving in % of GDP, INV^C is corporate investment in % of GDP. All regressions are estimated by GLS with a panel-wide AR(1) correction and include country fixed effects. Heteroskedasticity robust standard errors are reported in parentheses. Model (1) is estimated for the period 1990-2007. The models (2)-(7) include a dummy for the global financial crisis. All estimations include a constant term. L. denotes one year lag. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively. See Appendix 5.A for a detailed description of the data.

to examine whether the behavior of the corporate sector has been different during the Great Recession. The effects of the explanatory variables on the corporate financial balance are generally robust to the inclusion of the interaction terms. Our estimations show, however, that the coefficients on the interaction terms are mostly quantitatively negligible and statistically insignificant. Interestingly, the estimated effect of real GDP growth on the corporate financial balance seems to be even smaller during the Great Recession. Thus, the results of the different specifications reported in Table 5.5 suggest that the rise in the corporate financial balance cannot be explained by a temporary crisis phenomenon but rather follows a secular trend overlaid by cyclical fluctuations.

5.5 Concluding remarks

Recent academic and policy-oriented debates have highlighted the importance of corporate sector behavior as a potential driver of macroeconomic trends (e.g. Gruber and Kamin, 2016; IMF, 2017*a*, 2019*a*; Dao and Maggi, 2018, Behringer and van Treeck, 2019*a*). Another much debated empirical phenomenon is the decline in the labor share (and the rise of corporate profits) across countries since the early 1980s (e.g. Elsby et al., 2013; Karabarbounis and Neiman, 2014; Piketty, 2014; Autor et al., 2017, 2020; Dao et al., 2017; Barkai, 2020).

The present chapter contributes to these debates by analyzing the role of the functional income distribution for corporate saving and investment behavior. We document that the corporate sector has moved from a net borrowing position to a net lending position in major advanced countries over the past decades. Contrary to common belief, the rise of corporate net lending started well before the onset of the global financial crisis. Moreover, the financial surplus of the corporate sector prior to the financial crisis cannot be attributed to shifts in investment behavior. Instead, the rise in corporate net lending was largely driven by a secular upward trend in corporate saving.

A robust finding of our analysis is that changes in factor shares have statistically and economically significant explanatory power for the understanding of the evolution of corporate net lending. Rising corporate profits at the expense of declining labor income have translated into higher corporate saving and turned the corporate sector from a net borrower to a net saver. Moreover, it appears unlikely that the corporate balance effects of the profit share reflect the substitution away from labor and towards capital in response to a decline in the cost of capital, as suggested by Chen et al. (2017). This explanation would imply an increase in corporate investment as the decline in the cost of capital induces firms to produce with greater capital intensity. However, investment booms are difficult to find in the data for the pre-crisis period. Rather, our results are consistent with recent tentative evidence that rising corporate saving across advanced countries

is closely linked to greater concentration in corporate sales and assets and to increased markups (IMF, 2019*b*).

The trends in the evolution of corporate saving and corporate net lending have important implications not only for aggregate demand and national current account dynamics but also for the evolution of income inequality. Conventional measures of income inequality based on administrative tax data typically do not include undistributed income such as corporate retained earnings (Piketty et al., 2018). As corporate ownership is much more unequally distributed than household income, available tax data likely underestimate top income shares in those countries where corporate retained earnings have increased in recent years. Given the significant amount and high concentration of corporate income the picture of income distribution trends over the last decades might markedly change in a number of major countries. An important task for future research is thus to analyze the distributional implications of rising corporate retained earnings.

Appendix to Chapter 5

5.A Description of data

5.A.1 Corporate sector variables

Corporate financial balance: The corporate financial balance is defined as gross saving minus gross capital formation and other capital expenditures in percent of GDP. We employ several sources for the corporate financial balance. Our primary source is the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Mexico, New Zealand, Peru, and South Africa, we use data from the national accounts statistics provided by the Eurostat database. For Australia, Canada, South Korea, and the United Kingdom, we employ data from national statistical sources.

Corporate saving and investment: Gross saving of the corporate sector is defined as disposable income minus adjustments for the change in net equity of households in pension funds reserves in percent of GDP. Gross capital formation of the corporate sector consists of gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables in percent of GDP. Our primary source is the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Mexico, New Zealand, Peru, and South Africa, we use data from the national accounts statistics provided by the Eurostat database. For Australia, Canada, South Korea, and the United Kingdom, we employ data from national statistical sources.

Corporate profit share: We use the gross operating surplus in percent of GDP as proxy for the profit share. The gross operating surplus of corporations is defined as the gross value added at basic prices minus the compensation of employees and the difference between other taxes on production and other subsidies on production. Data are taken from the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Mexico, New Zealand, Peru, and South Africa, we use data from the national accounts statistics provided by the Eurostat database. For Australia, Canada, South Korea, and the United Kingdom, we employ data from national statistical sources.

5.A.2 Non-financial corporate sector variables

Financial balance of the non-financial corporate sector: The definition of the financial balance of the non-financial corporate sector is the same as for the corporate financial balance (see Section 5.A.1). Our primary source is the national accounts statistics provided by the Eurostat database. For Australia, Canada, Germany, South Korea, and the United Kingdom, we use data from national statistical sources.

Saving and investment of the non-financial corporate sector: The definitions of saving and investment of the non-financial corporate sector are the same as for corporate saving and investment (see Section 5.A.1). Our primary source is the national accounts statistics provided by the Eurostat database. For Australia, Canada, Germany, South Korea, and the United Kingdom, we use data from national statistical sources.

Profit share of the non-financial corporate sector: The definition of the profit share of the non-financial corporate sector is the same as for the corporate profit share (see Section 5.A.1). Our primary source is the national accounts statistics provided by the Eurostat database. For Australia, Canada, Germany, South Korea, and the United Kingdom, we use data from national statistical sources.

Distributed income of the non-financial corporate sector: Distributed income is defined as distributed income paid minus distributed income received by non-financial corporations. Our primary source is the national accounts statistics provided by the Eurostat database. For Canada, Germany, South Korea, and the United Kingdom, we use data from national statistical sources.

Financial accounts variables: We use several variables from the financial accounts statistics of non-financial corporations to analyze how saving is allocated across different financial assets. For this purpose, we use financial flows of long-term debt securities, loans, cash holdings and equity. Cash holdings are defined as the sum of currency and deposits, short-term securities and investment fund shares. Data are taken from the financial accounts statistics provided by the Eurostat database.

5.A.3 Other variables

Real GDP growth: Real GDP growth is calculated as the annual percentage growth rate of GDP at constant market prices. Data are based on 2010 reference levels and taken from the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Peru, and South Africa, we use data from the World Development Indicators (WDI) database (January 2019 version) provided by the World Bank.

Stock price volatility: Stock price volatility is defined as the 360-day standard deviation of the return on the national stock market index. Data for stock price volatility are taken from the Global Financial Development Database (GFDD) provided by the World Bank (July 2018 version).

Five-year forecast of real GDP growth: We use the five-year growth forecast as a proxy for the underlying growth potential of an economy. Data are taken from the Historical World Economic Outlook (WEO) Forecast Database (October 2018 version) provided by the IMF. We use the fall versions of the forecast data for real GDP growth between 1990 and 2016 in order to get as close to year-end data as possible. The fall version of the database is denoted as year t, so that the corresponding real GDP growth in year t is equivalent to the nowcast of real GDP growth. Then we take the forecast of real GDP growth five years ahead of time t for each country and year.

Foreign direct investment: We use net foreign direct investment flows in percent of GDP as a proxy for foreign investment activities of multinational enterprises. Net foreign direct investment flows are defined as outward flows of foreign direct investment minus inward flows of foreign direct investment in percent of GDP. Data are taken from the World Development Indicators (WDI) database (January 2019 version).

Stock market capitalization: Stock market capitalization is defined as the total value of all listed shares in a stock market in percent of GDP. Data are taken from the Global Financial Development Database (GFDD) provided by the World Bank (July 2018 version).

Relative price of investment goods: The relative price of investment goods is calculated as the ratio of the price deflator of gross fixed capital formation to the price deflator of GDP. Data are taken from the World Development Indicators (WDI) database (January 2019 version). For China, we use data from the August 2018 version of the WDI database.

Corporate income tax rate: The corporate income tax rate is defined as the basic central government statutory (flat or top marginal) corporate income tax rate. Data are taken from the OECD Tax Database. For the period before 2000, we use historical statutory corporate income tax rates from the OECD. For Bulgaria, Cyprus, Estonia, Lithuania, and Slovenia, we use data from the European Commission. For Brazil, China, Colombia, Peru, and South Africa we use data from KPMGs corporate tax rate table.

Real interest rate: Nominal long-term interest rates are defined as 10-year government bond yields. Nominal long-term interest rates are then deflated by annual changes in the GDP deflator. Data are taken from the AMECO database (November 2018 version) of the European Commission. For Australia, Canada, Iceland, Israel, Mexico, New Zealand, Norway, South Africa, South Korea, and Switzerland, we use data from the Economic Outlook database (No. 104, November 2018) from the OECD. For Brazil, Chile, China, Colombia, Costa Rica, India, Indonesia, Peru, and Russia, we use data from the World Development Indicators (WDI) database (January 2019 version).

Services sector value added: We use the value added of the services sector in percent of GDP as a proxy for shifts in the sectoral composition of economic production. Gross value added equals output valued at basic prices less intermediate consumption at purchasers' prices. Data are taken from the AMECO database (November 2018 version) of the European Commission. For Brazil, Bulgaria, Chile, China, Colombia, New Zealand, Peru, and South Africa, we use data from the World Development Indicators (WDI) database (January 2019 version).

Investment in intangible assets: We use investment in intellectual property products in percent of total gross fixed capital formation as a proxy for the growing importance of intangible capital. Intellectual property products denote intangible fixed assets such as R&D, mineral exploration, software and databases, and literary and artistic originals, etc. Data are taken from the OECD National Accounts Statistics database.

Current account balance: The current account balance is defined as the sum of net exports of goods and services, net primary income, and net secondary income in percent of GDP. Data for the current account balance are taken from the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Peru, and South Africa, we use data from World Economic Outlook (WEO) database (October 2018 version) provided by the IMF.

Household financial balance: The household financial balance is defined as gross saving minus gross capital formation and other capital expenditures in percent of GDP. Our primary source is the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Mexico, New Zealand, Peru, and South Africa, we use data from the national accounts statistics provided by the Eurostat database. For Australia, Canada, South Korea, and the United Kingdom, we employ data from national statistical sources.

Government financial balance: The government financial balance is defined as total general government revenue minus total general government expenditures in percent of GDP. We employ several sources for the government financial balance. Our primary source is the AMECO database (November 2018 version) of the European Commission. For Brazil, Chile, China, Colombia, Mexico, New Zealand, Peru, and South Africa, we use series from the Eurostat database. For Australia, Canada, South Korea, and the United Kingdom, we employ data from national statistical sources.

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