domains is varied. In this way, it is expected that the contact line develops as a finger on the lower domains, if the domain is hydrophobic, and spreads sideways to form a sawtooth if the domain is hydrophilic. Meanwhile, if the width of the upper domains is sufficiently small, the contact line is not expected to deform appreciably. However, for wide enough upper domains, a fingering-spreading process of the film, as on the lower domains, is expected.

Choosing the width of the thinner domains, w_h, as well as the lengths of the hydrophilic and hydrophobic domains, l_h and l_ϕ, fixes the fraction of the substrate composed of hydrophilic material, $f_{CB} = (w_h l_\phi + w_\phi l_h)/[(l_h + l_\phi)(w_h + w_\phi)]$. Given that the widths w_h and w_ϕ are fixed, the limiting cases of $l_\phi = 0$ and $l_\phi \to \infty$ correspond to patterns of adjacent longitudinal stripes, as the ones shown in figures 8(a) and 8(b). In the previous section we found that contact line growth is observed in these patterns. Consequently, at intermediate values of l_ϕ, growth is expected for checkerboard patterns.

We first consider the case in which the front can destabilize only on the wide domains, so we fix w_h to a value that is much smaller than the most unstable wavelength. To gain insight on the effect of the checkerboard pattern on the dynamics of the contact line, we consider the effect of varying the fraction of hydrophilic domains on the evolution of the thin film. We do this by fixing the length of the hydrophilic domains to an arbitrary value, which we choose as $l_h/x_c = 1.3$, while the length of hydrophobic domains is varied. The width of the upper and lower domains is fixed to $w_h/x_c = 1.3$ and $w_\phi = 8$, respectively. We consider six values of l_ϕ, namely, $l_\phi/x_c = 0.6$, $l_\phi/x_c = 1.0$, $l_\phi/x_c = 1.6$, $l_\phi/x_c = 2.7$, $l_\phi/x_c = 4.0$ and $l_\phi/x_c = 8.0$. The front is perturbed initially on the wider domains using the most unstable wavelength, and on the thinner domains using a wavelength equal to w_h. We follow the evolution of the total length of the contact line, L, by measuring its growth rate, $\dot{L} = \dot{L}(w_\phi, w_h, l_\phi, l_h)$, which is calculated as the difference between the leading and trailing edge velocities. The leading edge is located at the middle of the wider domains, while the trailing edge is taken as the contact line position at the middle of the thinner domains, as shown in figure 9.

The evolution of the front is tracked in figures 10(a) and 10(b) for $l_\phi/x_c = 0.6$, and $l_\phi/x_c = 8$, which correspond to hydrophilic fractions $f_{CB} = 0.25$ and $f_{CB} = 0.62$, respectively. In these figures we also show the finger that grows on a homogeneous substrate. For both checkerboard patterns, the contact line grows as a finger on a hydrophobic domain, then spreads out on a hydrophilic domain, and finally grows again as a finger as it touches the